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Molybdenum Steels Gaining Favor

Survey of Present Applications Shows a Large Tonnage Being Absorbed in Heat Treated Steel Parts and Case-Hardened Pieces Requiring Maximum Toughness and Uniformity

BY E. E. THUM

WHILE molybdenum alloy steels were made toward the middle of the last century, the rarity of the element prevented a systematic study of their characteristics and their commercial development. During the Great War a sudden demand for the metal arose, the price bounded up, and intensive prospecting for mineral deposits disclosed several in the western States. Thus it has developed that the "rare element" molybdenum is in reality available in any quantity, after the necessary time had elapsed in order to develop the mines and to build the reduction plants.

This changed situation encouraged an investigation of the utility of molybdenum in structural or engineering steels. These researches led to a conclusion which has since been verified by practical experience, namely, that molybdenum is most valuable when less than 1 per cent is added to steels containing other common alloying elements, such as nickel and chromium. It was immediately apparent that such combinations had superior resistance to shock and sudden load.

About 250,000 tons of steel containing molybdenum is used annually. Case-hardened pieces (either by carburization or nitriding) such as

Roller bearings
Gears
Camshafts
Wrist pins

consume a considerable fraction of the tonnage. Parts to carry high stress, such as

Axles
Connecting rods
Steering spindles
Aircraft fuselages

are made of the heat treated alloys. Large objects, requiring extra toughness and uniformity, like

Crankshafts
Hammer rams
Die blocks
Gun tubes
Armor plate

are made of these steels, together with other items such as

Corrosion resistant sheets
Soft steel for deep pressing
Hand tools

While higher molybdenum alloys had been made commercially by the crucible process many years before, the first electric furnace heat of low molybdenum steel was made in December, 1917; open-hearth production started in May, 1918, both events taking place at United Alloy Steel Corporation, Canton, Ohio. Use of the steel during war times was confined to those parts where the maximum toughness was required, namely, light armor for helmets and tank armor, armor piercing projectiles, and Liberty motor crankshafts. Uses since the war, which have so largely increased the tonnage, have been due to the more complex combination of properties listed below, to exploitation by producers of the metal, and marked reduction in price.

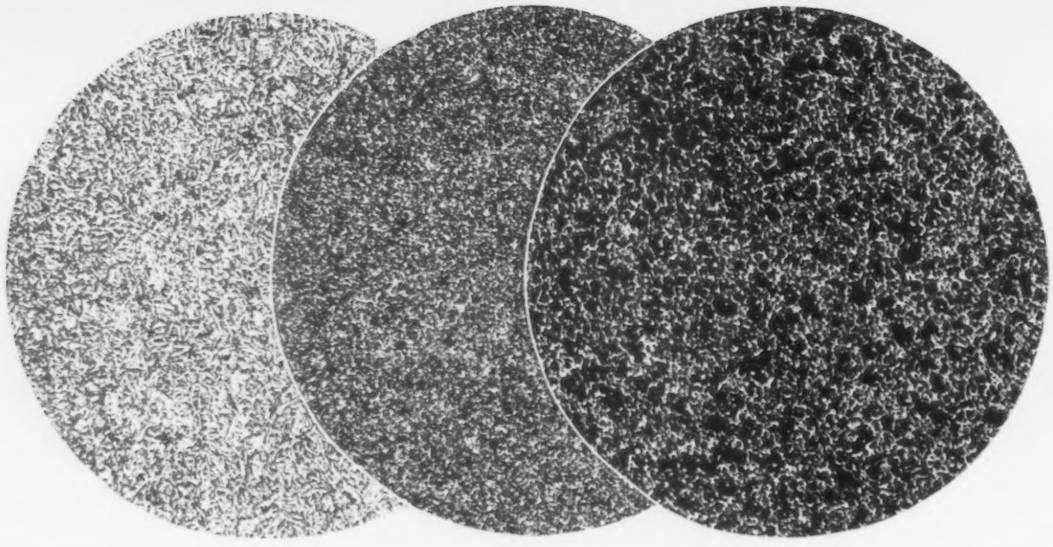
Molybdenum is marketed as ferromolybdenum, calcium molybdate, or calcium-molybdenum silicate; at least 250,000 tons of the low alloy steel now popular was made in 1928 in the United States. American mines monopolize the situation; the 1918 price of $5 has steadily declined to about one-fifth that figure.

Effect of Adding Molybdenum to Alloy Steel

Experience has developed the following facts about alloy steels containing a little molybdenum:

(a) The most prominent and unmistakable is an ability to induce air hardening and hardening at depth. A massive piece of such an alloy steel will be hard even at the center (where it cools comparatively slowly no matter how rapidly the surface is cooled); furthermore, moderate sized pieces harden effectively when cooled in air.

(b) Quenched alloy steels containing molybdenum hold their hardness after higher drawing temperatures. Longer times at heat are also required to complete the proper reactions; a sluggish rate of grain growth also prevents coarsened, brittle structures after relatively long heatings.



MEDIUM Manganese Steel with Molybdenum at 100 Diameters. As rolled, heat treated to 269 Brinell and after Mc-Quaid-Ehn test respectively

Molybdenum steels are tough after slow cooling from the draw, and thus are practically free from the "temper brittleness" which occasionally afflicts chromium and chromium-nickel steels.

(c) Molybdenum forms solid solutions with iron and widens the temperature range for both hot working and heat treating; therefore, a considerable variation in quenching and drawing temperatures has relatively slight effect when molybdenum is in the steel.

(d) Steels with 0.3 per cent of molybdenum, more or less, roll and drop-forge well; scale (which adheres to nickel steel so tenaciously) shells off cleanly during the operation.

(e) It cold works easily—thin walled tubing or stampings may be made without excessive wear on dies or undue scrap or rejects.

(f) Chromium steels with molybdenum machine somewhat more readily than nickel-chromium steels without it, Brinell hardness and other conditions being equal, especially when heat treated to high elastic limits. Tool costs are also reduced.

(g) The principal effect on the tensile properties of alloy steels with molybdenum is to increase markedly the percentage reduction in area. This is especially evident in nickel-molybdenum steels of abnormally high tensile strength (150,000 to 170,000 lb. per sq. in.), and is associated with improved impact values after draws of 1000 deg. Fahr. or more, despite the fact that the yield point approaches the ultimate strength (a condition ordinarily indicating brittleness). Compare the physical properties of a commercial chromium steel with a similar* chromium-molybdenum steel, after heat treatment to an equal tensile strength:

	Chromium Steel	Chromium-Molybdenum Steel
Chemical composition:		
Carbon	0.49	0.32
Manganese	0.53	0.72
Chromium	0.60	0.80
Molybdenum	...	0.27
Physical properties:		
Ultimate strength	125,300	125,650
Yield point	107,200	112,200
Elongation	18.0	21.0
Reduction	56.5	68.0
Izod impact	66	90

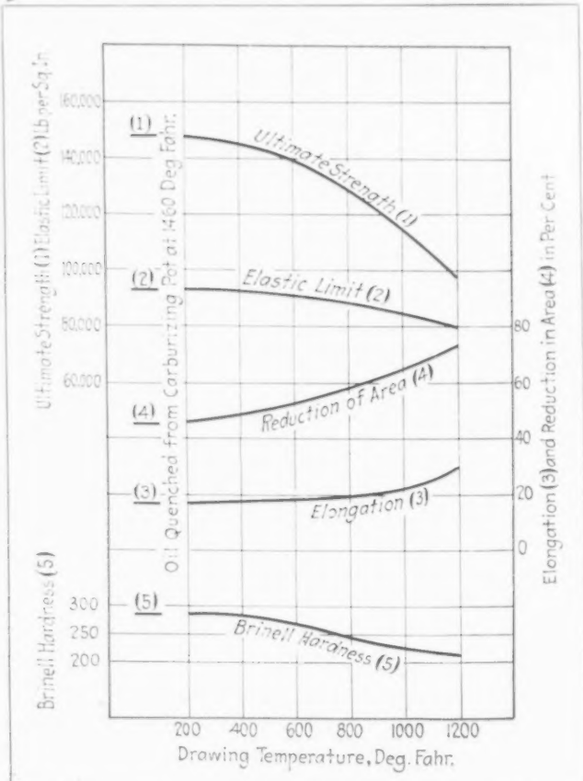
(h) Molybdenum in alloy steels has no specific influence in resisting repeated or alternating stresses. A high endurance limit (as determined by laboratory tests) is characteristic of any high tensile steel free from surface defects, internal stresses, segregates, or dirt and other non-metallic inclusions. Only as molybdenum may be relied upon to enhance these virtues, can it be regarded as having value as a resistor of fatigue.

*The chromium steel having a higher carbon would naturally be expected to be more brittle, but the chromium-molybdenum steel has the higher total in alloy content, which counteracts this to a certain extent.

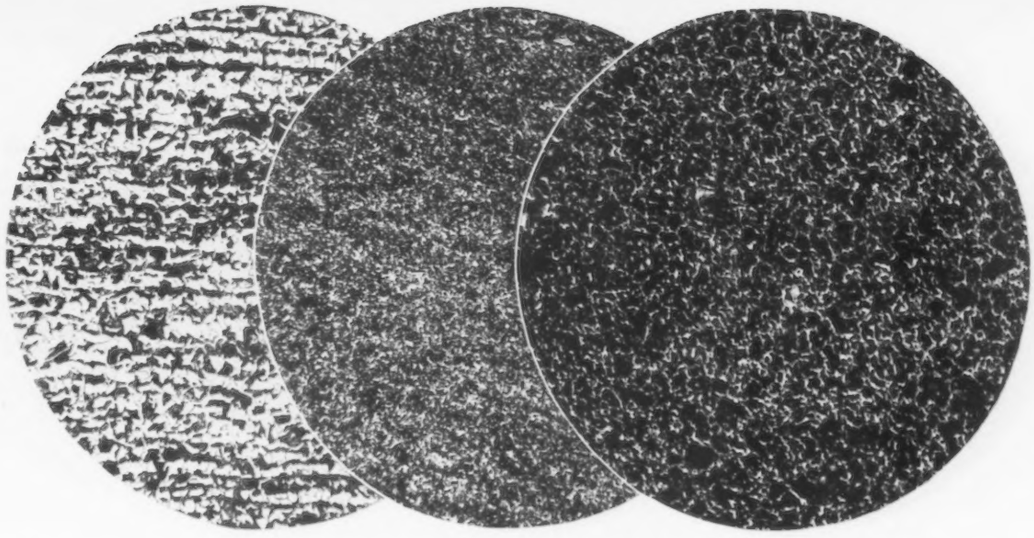
Nickel-Molybdenum Steel for Case-Hardening

FROM the above properties of steel—which for the most part are qualitative comparisons, in the sense that the difference between a steel with or without molybdenum has not been numerically evaluated—the following important uses have arisen:

A substantial part of the tonnage has been used after

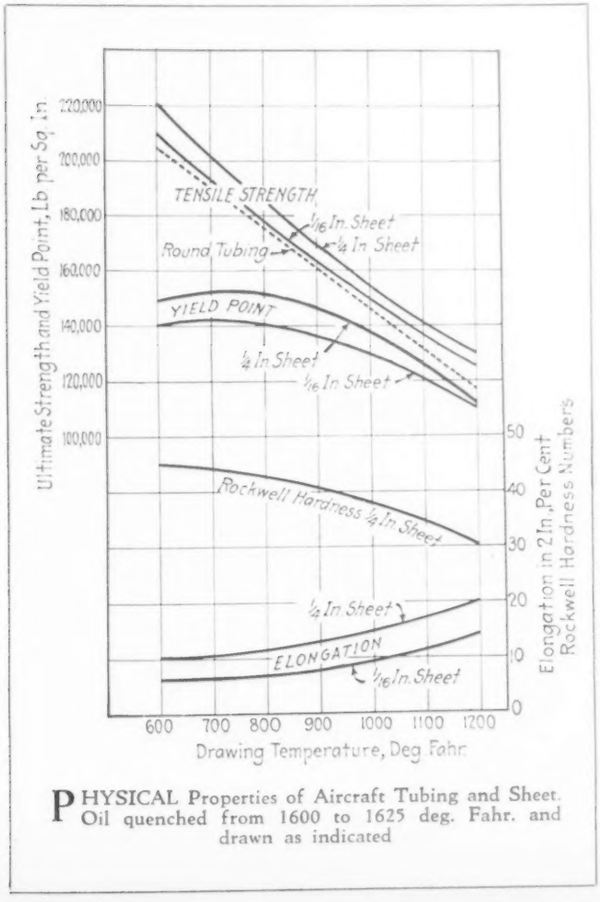


PHYSICAL Properties of Core of 1-in. Rounds, Case-Hardened Nickel-Molybdenum Steel, Single Heat Treatment (Quenched from Pot)



MEDIUM Manganese Steel at 100 Diameters. As rolled, heat treated to 269 Brinell and after McQuaid-Ehn test, respectively

carburizing in anti-friction bearings, for both cones and races. Piston pins, steering knuckle pins, camshafts, ring gears and other carburized parts for the automotive and machinery industries have also been made in great quantity of this material, a S.A.E. steel 4615 (C 0.10 to 0.20; Mn 0.30 to 0.50; Ni 1.25 to 1.75; Mo 0.20 to 0.30). Recommended heat treatment is: forge at 2100 to 2200 deg. Fahr., finish forging at a relatively high temperature, normalize at 1650 to a Brinell hardness of about 160. Machine, and then carburize at 1675 deg. Fahr. Oil quenching from the carburizing pot at about 1500 deg. Fahr. (or after cooling in the pot, reheating and oil quenching) then gives good strength in the core, as is shown in the accompanying chart; this comparatively mild treatment after machining and carburizing is usually sufficient and the part may be ground to precise dimension immediately or it may be given a 30-min. draw at about 300 deg. Fahr. to relieve internal strains. In any event this relatively simple treatment avoids nearly all the distortion which accompanies multiple heatings and coolings necessary to harden the case and properly refine the core of a carburized chromium steel.



PHYSICAL Properties of Aircraft Tubing and Sheet. Oil quenched from 1600 to 1625 deg. Fahr. and drawn as indicated

Such "single treatment" carburizing steels exist by virtue of their property of resisting grain growth, even when heated considerably above the minimum temperature required for complete hardening, and therefore of avoiding a coarsened and brittle core. If the carburized parts are simple in shape, like a wrist pin, they can be water quenched to a case 85 to 90 scleroscope hard.

Ring gears made from S.A.E. 4615, carburized, cooled in the pot, reheated to above the critical temperature of the case, quenched in oil in a press, and then tempered at 300 deg. Fahr. should be within 0.003 in. of flat and round (80 per cent should be no more than 0.0015 in. out of flat nor 0.002 in. out of round). Reheating for quenching in a cyanide bath is liable to give a file-soft surface layer; oil quenched from the furnace carburized gears should have Vickers-Brinell hardness of 755 at 0.010 in. below the surface. This high surface hardness is associated with extreme toughness; Izod impact bars carburized and heat treated in regular gear-making routine have strength of 23 ft.-lb., double the figures for carburized nickel steel. Transmission gears for heavy trucks and buses, or gears for superchargers, where high surface hardness and toughness is required, would be made of 1.5 per cent nickel-molybdenum steel. Where gears of maximum strength are needed, carburized 5 per cent nickel steel is preferable.

From a steel maker's viewpoint, a nickel-molybdenum steel is desirable because none of the alloying elements are lost during melting or remelting. Practically complete recoveries on recharged scrap may be effected.

Manganese-Molybdenum Steel

Medium manganese steels are being used for carburizing. It has been established that 0.25 per cent molybdenum will improve the Izod impact values (representing toughness) of medium manganese steel at least 10 per cent, a change associated with a fine grained microstructure after carburization in the McQuaid-Ehn test. Molybdenum also appears to improve the uniformity of response to heat treatment, decreasing the number of rejects beyond specification limits when a medium manganese steel without molybdenum is carburized. Comparison of the physical properties of fine-grained electric steels both with and without molybdenum is given in the table on the next page.

Comparison of Physical Properties

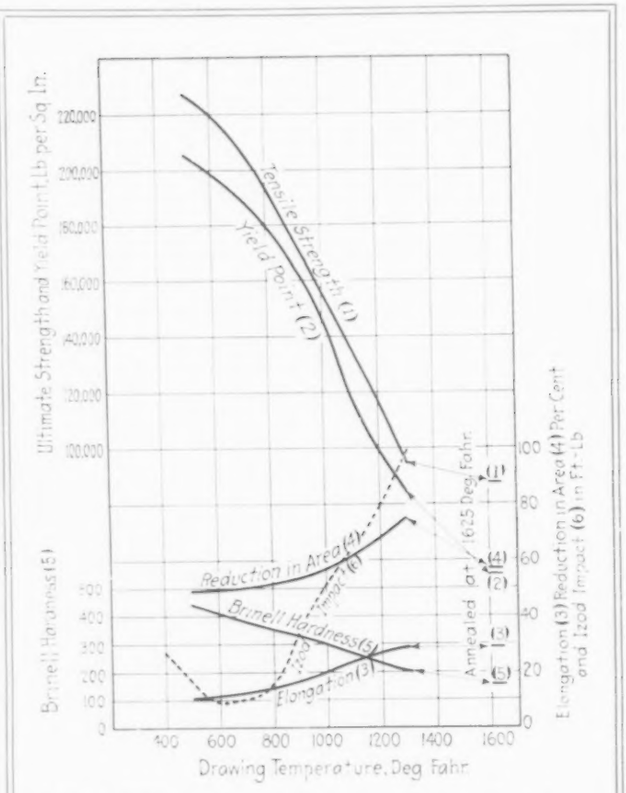
	With Molybdenum	Without Molybdenum
Chemical analysis:		
Carbon	0.28	0.26
Manganese	1.59	1.46
Molybdenum	0.27	...
Phosphorus	0.02	0.02
Sulphur	0.02	0.02
Water quenched from	1525 deg. Fahr.	1525 deg. Fahr.
Hardness at surface	534	514
Hardness at center	534	477
Drawn at	1100 deg. Fahr.	800 deg. Fahr.
Hardness at surface	269	311
Hardness at center	269	269
Ultimate strength	129,000	129,000
Yield point, lb. per sq. in.	116,000	107,100
Elongation in 2 in., per cent	21.0	21.0
Reduction in area, per cent	66.7	65.1
Izod impact, ft.-lb.	91	78*
Microstructure†	Page 142	Page 143

Medium - manganese steels with molybdenum carburize about 75 per cent deeper in a given time than the nickel-molybdenum steels (S.A.E. 4615). Transverse strength of hardened bars is about the same, but the impact strength of the case-hardened and heat treated Izod bars is much inferior, about 2 ft.-lb. Vickers hardness of the steel, oil quenched from the pot, is 715, and this hardness is maintained to a depth of 0.035 in. These characteristics indicate it would be useful for inexpensive gears, for instance, where the load is steady and not severe, and where lubrication may at times be deficient.

Hardening by Ammonia Gas

It has been found that certain alloy steels (notably those containing about 1 per cent aluminum) acquire an extremely hard surface when heated for 20 to 90 hr. in an atmosphere of ammonia gas at about 1000 deg. Fahr. No quenching is required, the hardness being intrinsic in the metallic compounds formed, whose nature is obscure. Such patented aluminum alloys, exploited under the trade name "Nitralloy," or chromium or other alloy steels which may also be case-hardened in the same manner, become quite brittle in the core after such long heating at low temperature, and this trouble has been largely avoided by the addition of about 0.20 per cent molybdenum to the analysis. Larger additions of molybdenum seem also to increase the speed of the nitriding reactions.

Chromium steels with molybdenum for case-hardened articles have not been used very much. The rapid and deep hardening propensities induced by molybdenum intensifies the natural hardness of the chromium steel, and therefore the core lacks the toughness required, for instance, for clash gears, except after complex heat treatment comprising normalizing, oil quench from the pot, a double heat treatment and a final draw at 385 deg. Fahr., timing each operation carefully. Such extreme precautions will not be necessary when an extremely hard case is the main consideration, and a tough core of minor importance.


Ultimate Strength and Yield Point Lb per Sq. In.
Tensile Strength (1)
Yield Point (2)
Reduction in Area (4)
Izod Impact (6)
Brinell Hardness (5)
Elongation (3)
Annealed at 1625 Deg. Fahr.
Elongation (3) Reduction in Area (4) Per Cent and Izod Impact (6) in Ft.-Lb
Drawing Temperature, Deg. Fahr.

PHYSICAL Properties of S. A. E. 4130 After Quenching in Water from 1500 deg. Fahr. and Drawing as Indicated. (Izod specimens were oil quenched). Approximate Chemical Analysis:

	per cent
Carbon	0.25
Manganese	0.60
Silicon	0.10
Chromium	0.80
Molybdenum	0.30

Chromium-Molybdenum Steels for Automobiles and Aircraft

MAJOR fraction of the molybdenum produced every year goes into chromium-molybdenum steels made into the S.A.E. specifications 4130 or 4140, for making automobile connecting rods, axles, steering spindles or other highly stressed machine parts. An interesting application of 4130 is for high grade jaw and socket wrenches; sufficient strength and hardness can be had by heat treatment to avoid the necessity of case-hardening. The chemical limits are:

	S.A.E. 4130	S.A.E. 4140
Carbon—	0.25 to 0.35	0.35 to 0.40
Manganese—	0.40 to 0.70	0.40 to 0.70
Chromium—	0.50 to 0.80	0.80 to 1.10
Molybdenum—	0.15 to 0.25	0.15 to 0.25

The first mentioned steel is water hardening; the latter must be oil hardened to avoid quenching cracks. Both are machinable up to 350 Brinell, although a hardness range of 215 to 240 will permit very rapid machining. Heat treatment includes a relatively high draw for a long time—see (b) above. Physical properties are shown on the adjoining chart.

To indicate the fact that close adjustment of quenching temperature to minor variations in chemical analysis is unnecessary—a matter of importance in mass production—the following tests on ⅞-in. rounds, all after quenching in water and drawing at 1050 deg. Fahr., may be cited. The steel was S.A.E. 4130, with chromium and molybdenum on the high side.

Quench	Tensile Strength	Yield Point	Elongation	Reduction	Brinell	Izod
1500	163,500	140,000	18.5	62.7	319	58
1600	161,700	139,500	17.0	63.1	321	62
1700	160,400	138,400	17.5	61.7	321	60
1800	158,500	138,300	18.0	61.5	319	61
1900	159,600	139,600	16.8	57.9	317	56

A quenching temperature of 1550 to 1650 would get the maximum physicals with the minimum amount of heat. Draws should be at 1000 deg. Fahr. or more to insure good toughness (high Izod figures).

A slightly different analysis than S.A.E. 4130 is very

(*Continued on page* 201)

*Most of this loss of toughness would be expected to be due to the lower drawing temperature.

†Microphotographs by the kindness of Thomas W. Hardy.

More Alloy Steel Made in 1929

Increase Over 1928 Perhaps 15 Per Cent—Most Forms of Steel Show Substantial Gains—Motor Cars Take Five-Eighths

RETURNS from nine alloy steel producing companies, including all of the large producers, showed rolled steel amounting to 897,514 tons in 1929, with December estimated. These returns do not include certain large tonnages of steel covered in the figures reported by the American Iron and Steel Institute. Prominent among the missing items are copper-bearing steel and a number of other alloy steels in which the alloy constituent is below certain minimum percentages.

In the table is shown the distribution of the alloy steel reported by the nine companies, not only among the different types of steel, but also among the consuming industries. About 73 per cent of the total comes under the heading of bars. Sheets accounted for nearly 9 per cent, billets and slabs, including forgings, for a like amount, tubes and pipe for something less than 5 per cent, strip steel for a little over 3 per cent and plates for less than 1 per cent.

About Five-Eighths of the Alloy Steel Went Into Automobiles

Among the industries taking alloy steels, the distribution, on the basis of the returns of nine companies, shows more than 62 per cent going into automobiles and automobile parts. No other industry as listed absorbed much more than 3 per cent. Agriculture went 3.1 per cent, forging steel, as separate from the individual industries, about 2.5 per cent, and machinery and tools, about 2.3 per cent. Only a little over 1 per cent of the total was exported and the unclassified list covered more than 22 per cent.

Comparing the returns with those for practically the same companies for 1928 (the difference in companies reporting being confined to two or three small units) we find that the plate tonnage has almost doubled since last year, the bars have gone up 24 per cent, sheets have increased 39 per cent, tubes and pipe, about 9 per cent, and strip steel, 20 per cent.

There has been a sharp reduction in billets and slabs of alloy steel reported, production of which, according to the returns, dropped approximately 37 per cent. The total figures for the companies reporting show an increase of about 9½ per cent, which is a little greater than the 8½ per cent increase in total steel production in 1929 compared with 1928.

Subdividing individual products, it is seen in the table that the automotive industry took the largest tonnage of six of the seven items listed (not counting "miscellaneous" or undistributed uses). More than two-thirds of all the bars, four-fifths of the tubes and pipe and nearly three-fourths of the strip steel went into motor cars. A similar proportion of the distributed tonnage of black sheets and of billets and slabs and more than one-half the distributed plates went to the same place. Only in structural shapes did another industry—building—hold first place.

Difference of Opinion as to Dividing Line on Alloy Steel

Widely varying views as to what constitutes alloy steel account for the failure of many compilations to accord closely with each other. Totals reported by the American Iron and Steel Institute for 1928 amounted to 3,045,225 gross tons of ingots and 169,684 tons of castings. With the considerable loss from cropping and scale in the manufacture of alloy steel—a drop of approximately 39 per cent—the ingot figures of the institute might be translated into about 1,860,000 tons of rolled steel in 1928.

Trade estimates for 1929 report increases varying from 10 to 25 per cent. If we take 15 per cent as a fair average, then the rolled alloy steel in 1929 must have been about 2,150,000 tons.

Production of Rolled Alloy Steel and Main Channels of Consumption in 1929

(Gross Tons, as Reported by Nine Steel Companies)

	Plates	Structural Shapes	Bars	Black Sheets	Tubes and Pipe	Strip Steel	Billets and Slabs	Total
Railroads	168	.....	5,774	68	.....	.....	2,691	8,701
Building construction	2,654	518	704	.....	.....	.....	8	3,884
Automobiles and parts	3,253	172	448,665	16,195	36,150	20,797	34,442	559,674
Oil, gas and water companies	69	.....	17,893	51	600	.....	1,133	19,746
Mining and lumbering companies	.....	.....	1,339	.....	.....	.....	8	1,347
Agricultural implements	.....	.....	18,658	.....	3,150	5,935	27	27,770
Metal containers	.....	.....	405	.....	.....	.....	.....	405
Shipbuilding	.....	.....	388	.....	.....	.....	72	460
Boilers and tanks	.....	.....	.....	.....	3,766	.....	.....	3,766
Machinery and hand tools	139	17	19,639	.....	.....	.....	1,078	20,873
Bolts, nuts and rivets	.....	.....	502	.....	.....	.....	.....	502
Electrical manufacturers	.....	.....	1,766	2,249	.....	.....	20	4,035
Forgers	.....	.....	22,500	.....	.....	.....	128	22,628
Pressed and formed metal	.....	.....	3,281	.....	.....	.....	2	3,283
Jobbers and warehouses	.....	.....	9,820	.....	.....	.....	576	10,396
Exports	35	.....	9,225	142	.....	291	33	9,726
Miscellaneous	939	96	96,280	61,347	270	1,595	39,791	200,318
Total	7,257	803	656,839	80,051	43,936	28,618	80,009	897,514

Gain in Building in Prospect

Outlook for 1930 Is for Increases in Public Engineering Projects and Upward Trend in Residential Construction

BY THOMAS S. HOLDEN*

THE volume of construction is so important in the American economic system that it seems reasonable to say that any prolonged construction decline tends toward business stagnation. We rely on investment of capital accumulations in new living facilities, new production facilities and in public improvements to effect that necessary distribution of purchasing power which causes the general volume of business to increase. This is perhaps more important in this country than in any other industrial nation, since we depend so much more than any other people on an expanding home market for consumption of our products.

For this reason, the President's program of stabilizing business through encouraging public building and construction of public works projects is economically sound. There is now, and there has been for a long time, a very strong demand for public improvements of every kind to meet the pressing needs of our growing and changing communities.

In setting forth the construction prospects for 1929 in these pages a year ago, this writer stated that increased construction in 1929 depended principally upon increased engineering work. It was also stated that building work would be approximately equal to the average volume of the years 1925-1928, which meant a moderate recession from the peak year 1928.

This forecast anticipated a financial adjustment in the early months of last year, early enough to permit the bond market, which had been declining during the latter part of 1928, to turn upward soon enough to give the 1929 construction program the benefit of some months of improvement before the year's close. The prolongation of the bull market in stocks and the consequent severity of the deflation of stock prices when it finally came in late October are now matters of history.

Obstacles to Building Resumption Swept Away

IN many respects, the stock market collapse was delayed considerably beyond its natural time. It came after interest rates had reached a peak and turned down, after bond prices had reached bottom and turned up, after general business activity had reached a peak and turned down, after the volume of construction contracts had been declining for 17 months. While this financial upheaval knocked the 1929 construction program into a cocked hat, it swept away the obstacles to resumption of the construction growth of the country and set the stage for improvement in 1930.

One important result of the financial chaos that prevailed during most of last year was to set back the country's program of civil engineering development just about a year. The principal and immediate cause of this was the continued decline in the market for municipal bonds. The result was a volume of civil engineering expenditures just about equal to that of 1928, in the face of a demand for a sizable increase. Consequently, there is a big hold-over demand for work of this class, with many projects already planned that have not yet gone ahead, and many projects to be planned at early dates to meet urgent needs.

With the stimulus of easier financing through bond issues, and with the encouragement given by the President's business conferences and their attendant publicity, there is assurance amounting to practical certainty that expenditures for highways, flood prevention, sewer projects and similar public improvements will be measurably increased in 1930. Along with these engineering projects there will also undoubtedly be large increases in public building projects, many of them long needed and many already provided for by Government appropriations. Expenditures for public improvements are likely to show more conspicuous increases in 1930 than any other class of construction work.

Commercial and industrial building expenditures increased considerably in 1929. They usually do increase in a period when general business and stock market activity are on the upgrade, and they are in consequence less likely to have further increase in 1930. Recent surveys have shown rather more than normal percentages of vacancies in large office buildings, and this class of work seems due for a quiet period in order that demand may catch up with supply. Manufacturing facilities are not likely to be increased greatly in the coming year, though plant modernization and installation of cost-reducing machinery and processes are likely to proceed at a satisfactory rate. Large industrial and commercial organizations have ample funds for plant extensions; apparently they had more than ample funds in 1929, since, in addition to spending considerably more for new buildings than in 1928, they had funds which they employed in the call money market. Here was a rather anomalous situation; large accumulations of funds, available for a program of very considerable industrial expansion, but diverted into speculative uses because a full expansion program was restricted by fear of creating too large a surplus of manufacturing capacity. This same deterrent is apt to curb factory building of most classes in 1930. But, if there should be decreases in factory building expenditures, they seem quite likely to be made up by increased power projects and extensions of public utility facilities.

Sizable Increase in Residential Building Expected

THE one class of work that suffers most in a period of stock market speculation is residential building, including apartments, two-family houses and one-family houses built in development projects. Not only were invest-

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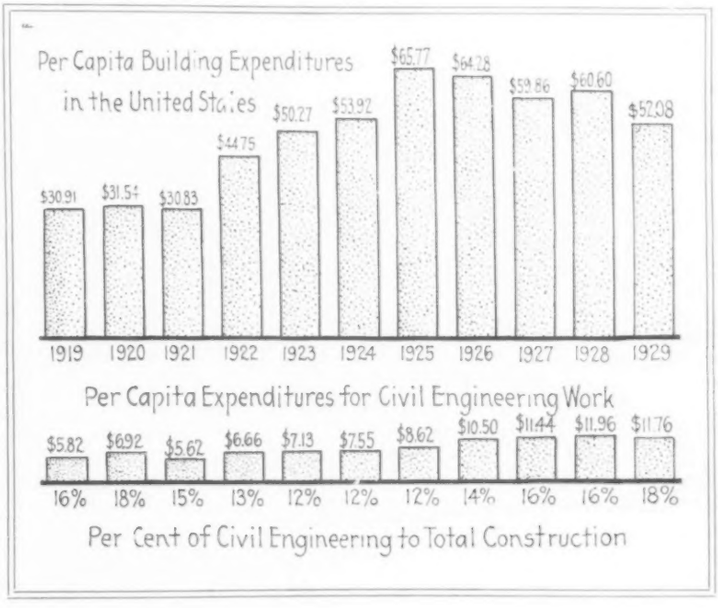
ment funds diverted from the usual mortgage loan channels in 1929, but there were even considerable withdrawals from savings accounts and a check in the growth of assets of building and loan associations. Private dwellings, particularly of the better types, did not fall off so seriously as did residential buildings of investment and speculative types. But residential building expenditures as a whole decreased 28 per cent from 1928. In one respect, this was a good thing. There was some oversupply of residential buildings at the opening of the year, and the reduced volume of this class of work has brought about some correction and a consequent improvement in residential building demand. Consequently, a sizable increase of residential work of all kinds is to be expected in 1930, though not to the point of equaling the volume of the peak year 1928.

There is a peculiar problem in residential building. The American people keenly desire better houses and apartments, with all that is best in modern design, materials and conveniences. But the cost of new buildings is too great for more than a small portion of this nation-wide desire to express itself in effective demand for new buildings. Modern buildings can only be sold or rented at the expense of rendering existing buildings obsolete. It is rather likely that the obsolescence factor in residential buildings is increasing, but we have not yet arrived at ways of disposing of old buildings as simply as we junk old cars. At the present time an organized movement for modernization of old buildings, particularly houses, is under way. Its progress was doubtless impeded somewhat in 1929 by generally unfavorable conditions. Apparently there is an excellent opportunity for this kind of work to go ahead at an accelerated pace in 1930; estimates of the probable volume of this class of work for this year have run as high as a billion dollars. This is the present method by which the obsolescence problem in residential buildings is being met, and it is good economic procedure. But, the question arises as to whether in the long run we shall not have to invent radically new residential building designs, with simpler and more economical uses of materials, in order to produce housing for a larger market at lower costs. This, however, looks to a future more distant than the present year.



Per Capita Building Expenditures Less in 1929

IN the chart accompanying this article it is shown that per capita building expenditures decreased rather severely in 1929, and per capita engineering expenditures dropped very slightly. This interruption in the country's program of construction expansion was more serious than anticipated, due to considerably less financial stability in 1929 than most people expected. Considering all the indications of improvement now existing, it is reasonable to estimate a 10 per cent increase in total construction expenditures over 1929, provided improvement in the construction contract record occurs during the first quarter of the new year. Since such improvement can usually be counted on five or six months after an upward turn in the bond market, a bettered first quarter record is likely.

The writer's estimates for all building and engineering work in the United States are as follows: average for years 1925-1928, $8,641,000,000; 1929, $7,677,000,000; 1930, about $8,514,000,000. This last figure is just a little under the four year average, 1925-1928, and represents a year of recovery rather than a year of expansion. This figure would differ from the figure for 1925-1928 in having larger percentages of public and institutional building work, public works and utilities, power developments and other engineering projects, and modernizations, and a smaller percentage of residential buildings. Non-residential building as a whole should be nearly equal in volume to that of 1929; residential building should increase from 15 to 20 per cent, civil engineering expenditures may increase as much as 20 per cent. These figures would indicate per capita construction expenditures of $69 in 1930, divided as follows: $55.92 for building; $13.08 for engineering work.

Reference to the chart shows that civil engineering expenditures represented 17½ per cent of total construction expenditures in 1929, compared with 16 per cent of the total in 1927 and in 1928. The estimated figures for 1930 indicate 19 per cent of the total for civil engineering work. While per capita building expenditures dropped from $60.60 in 1928 to $52.08 in 1929 (due entirely to reduced residential building), the indicated increase to $55.92 in 1930 seems reasonable.

If prosperity is to continue in this country at something near the levels of the past five years, it seems necessary that a proper proportion of national income must continue to be spent for new buildings and that per capita expenditures for this purpose at the rate of $60 per annum would be reached again in the next year or so, even though such an increase is not likely this year.

Substitute for Hand-Puddled Wrought Iron Studied

A report, soon to be published in the Bureau of Standards *Journal of Research*, gives information on the comparative properties of wrought iron made according to the recently developed Aston method and the similar product made by hand puddling.

Results of the tests indicated no marked or significant differences between the two irons. The product made by the new process appears to have all the earmarks usually associated with the name, wrought iron. The new-process iron, in the tests carried out, was more uniform in its structure than was the hand-puddled product; on the other hand, its tensile strength was slightly lower, but the ductility was higher. No significant differences in corrosion resistance of the two irons were revealed by the corrosion tests carried out.

Selecting Heat for Heat Treating

Its Source Is an Economic Problem—Factors Favoring Electricity, Gas, Oil or Wood—Cost Problems in Steel and Non-Ferrous Products

BY ROBERT M. KEENEY*

SELECTION of the source of heat for the industrial heat treatment of metals is an economic problem. The final choice should be decided by the economics of the situation, as shown by the overall cost of the product for the different forms of heat. The mere fact that a heat unit in fuel oil may cost two or three times as much as a heat unit in coal does not necessarily indicate that coal is the proper fuel. Oil can be burned much more efficiently than coal and at a lower labor cost. If the heat-treating department of a plant decides that oil is the cheapest fuel for heat treating, it does not necessarily mean that the company will show greater yearly profit by its use. It is not a question of individual process economy, it is a question of overall economy.

R. M. Keeney

Items Influencing Overall Cost

Among the items which influence overall cost are: Fuel, power, labor, cleaning of product, maintenance, capital charges, storage of raw material and finished product, the dollar value of quality and rejections, straight-line production, machining and working conditions. Many industrial fuel engineers tend to overemphasize B.t.u. cost in making cost comparisons of various fuels, and, when considering their own particular pet fuel in comparison with electricity, they seldom get any further. Some inexperienced industrial electric heating engineers overemphasize the intangible advantages of electric heat. Neither argument can stand up in the face of the overall economic situation. Lower cost per B.t.u. means nothing if inefficient utilization, higher labor cost and greater spoilage results in less profitable operation, just as the admitted intangible advantages of electric heat are worthless, if they do not produce a saving in overall costs and increased profits.

If the intangible advantages are real advantages, they will in some way affect costs. The heat chosen must result in the lowest overall cost, or it will eventually be displaced by some more economical form of heat. The sales enthusiasm of the public utility selling electricity or gas, or the furnace manufacturer, has sometimes resulted in disregard of the economics of the situation, followed invariably by removal of the furnace and loss of the heating load to the form of heat which a careful truthful analysis of the whole manufacturing process from the heat-treatment operation to shipment of the finished product would have indicated in the first place.

Sometimes an uneconomical application results from a persistent leaning of the manufacturer toward one form of fuel. A few years ago it was not unusual to find a factory using only one source of heat for many different heat-treating operations. This tendency is rapidly disappearing, as it has become more generally realized that a heat best suited to one operation may not fit another.

Heat Treating in Connecticut

LOCAL economic conditions in Connecticut are favorable to electric heat treatment and are becoming increasingly favorable to the use of gas. Most of our industries are metal working, and many are highly specialized branches of the metal-working industry in which quality is of major importance. It is only natural that there should be a local trend toward the use of electricity and gas for heat treatment, as in general, economic conditions provide a sound basis for this trend.

Electric furnaces are in operation for annealing, hardening and tempering steel, the bright annealing of copper and nickel silver, and annealing brass. Gas is used for hardening, tempering and carburizing of steel, for annealing of nickel-silver shells, and more recently for large production annealing of brass. Oil furnaces anneal, harden, temper and carburize steel and anneal brass and copper in the large rolling mills, and anneal malleable iron. Coal is mainly used only for the annealing of malleable iron and steel, but there are still a few coal-fired carburizing furnaces and brass annealing furnaces in operation. We still have the most ancient of fuels, wood, in use on a large scale for the finishing anneal of brass sheets in the large rolling mills. It appears that this may be replaced by city gas.

Ball Bearings and Cold-Rolled Steel

From a production standpoint the two most important applications of annealing of steel in the State are in the ball bearing industry and in the cold-rolled steel industry. Two ball bearing manufacturers use oil for annealing and the third now does its entire annealing with electricity. This manufacturer now has in operation an installed capacity of 1200 kw. in eight 150-kw. electric furnaces, all of which operate off peak at night so that the furnaces create no additional demand and the cost of power is 9 mills per kwhr.

Another very important annealing operation in the industries of Connecticut is the bright annealing of cold-rolled sheet steel. The trend from coal to oil and to electricity is shown in these plants in that of three manu-

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facturers using coal five years ago, two are using both coal and oil and a third is using electricity entirely.

During recent years a considerable number of coal and oil-fired furnaces used for carburizing have been replaced by electric furnaces. Viewed from a general standpoint, it seems somewhat difficult to justify some of these installations on an economic basis, but as the number of installations continues to grow, it is evident that the individual manufacturer thinks that in getting an improved product, there results a saving in overall cost which justifies the investment.

Also, in many of these installations, carburizing is conducted only at night, which with the form of power rate prevailing in most of the large cities of the State, results in an energy cost of from 0.8c. to 1c. per kwhr. On this basis the heat cost for electric heating is closely competitive with oil and probably cheaper than coal, when the labor for coal firing is taken into account.

Carburizing in Rotary Drum Furnaces

Interesting results are now available on the comparative cost of carburizing small pieces in modern insulated, rotary drum, gas-fired furnaces and rotary drum electric furnaces. In each case solid carburizing compound was used with an average length of heat of from 8 to 10 hr. and a temperature of 1690 deg. Fahr.

The gas furnaces were charged with 500 lb. of steel when operating under the above conditions and consumed 16,400 cu. ft. of gas per ton of steel, or 8.2 cu. ft. per lb. With a marginal cost of gas of 95c. per 1000 cu. ft., the heat cost for carburizing was $15.60 per ton or 0.78c. per lb. In the case of electric furnace the charge was larger, being 800 lb. per heat. With other conditions the same as on the gas furnace, the production of carburized pieces per kilowatt hour amounted to 3.24 lb., or 618 kw-hr. per ton, and the heat cost for electricity per ton of material carburized was $7.40 or 0.37c. per lb., less than half of that in the insulated gas furnace, with marginal power at 1.21c. per kwhr.

A study of the overall efficiencies of the furnaces on this operation, based on the above figures, will indicate the reason why the rotary drum furnaces are an excellent application for electricity. In this case the electric furnace has an overall efficiency of approximately 24 per cent, and the gas furnace approximately 7 per cent. It is not one of those cases where electricity has been compared with an obsolete fuel furnace, as the gas furnace was modern and purchased within the last year and one-half. The comparatively high efficiency of the electric furnace is due to the fact that there are no flue losses and also end or through metal losses have been eliminated, as the drum does not project outside of the insulated chamber.

In recent years a large number of oil-fired hardening furnaces have been replaced in Connecticut by gas or electric furnaces. In some localities there is a decided trend toward electricity and in others the use of gas is expanding more rapidly. These changes have been particularly true in the case of industries having a large quantity of production hardening.

Electric Hardening for Ball Bearings

After several years of investigation electric hardening furnaces are being introduced rapidly into the ball bearing industry. Five large plants now either have their hardening departments completely electrified or equipment purchased for so doing. In four of these cases electricity is replacing oil and in the fifth, gas. In the latter case the electric furnace eliminated rejections of the races for improper hardening in this plant, and as the complete hardening room is now electrified a considerable saving in labor has resulted. This plant also does all of its drawing in electric furnaces of the forced air circulation type, which replaced gas-heated oil baths. With the exception of gas-fired, rotary drum, furnaces purchased a short time ago, and which are now being replaced by electric rotary drum furnaces, all heat treating in this plant is performed in electric furnaces—hardening, drawing, annealing and carburizing.

In the plant of a large spring manufacturer, a gas-heated, modern, belt-type furnace is operating very successfully on production hardening of small pieces. An additional unit is being added. Gas in this case replaces oil. This same manufacturer has a large number of gas-fired lead pots for the continuous hardening and drawing of strip steel. These pots operate very successfully and show a considerable saving from the oil pots formerly used, because of lower maintenance cost. This concern used oil for large production annealing and for some of its hardening and gas for lead pot hardening and drawing. Each time a new application has arisen, they have investigated electricity as well as gas, but for their local situation they feel that gas is considerably more economical than electricity. This situation is accentuated by the fact that they are a comparatively small power user, but a very large gas consumer.

City Gas for Annealing Brass Sheets

Oil for annealing in the breaking down operations and wood for the finishing anneal are the basic fuels of Connecticut brass rolling mills, although some coal is used. The most important development of the past year in rolling mill annealing has been the installation of a large continuous furnace heated with city gas for annealing coiled brass sheets, replacing wood on the finishing anneal. The installation has been so successful that the use of gas for the operation may extend rapidly, and under suitable local economic conditions may replace oil for all rolling mill annealing in some mills. A bright anneal is not being obtained, but the finish of the brass is superior to the product of the wood muffles, and the heat cost with gas is only slightly higher than with wood.

Electricity was considered for this operation, and it appears has been rejected, because the finish obtained was not so good as with gas. One objection was the effect of grease and dirt on the brass entering the annealing furnace. In the electric furnace the dirt is not oxidized or burnt off as in the combustion furnace, and tends to bake on the brass. This becomes a rather serious matter on the finishing anneal. The control of the atmosphere in the electric brass annealing furnace is a subject worthy of much investigation, because with the same surface finish, electricity is closely competitive with gas on a heat basis in many situations.

While electric furnaces have not progressed very rapidly in large rolling mills in Connecticut, there is a steady increase in the number used for the annealing of brass tubing and shells in specialty plants. The original 350-kw. muffle, installed in Waterbury in 1923 for tube annealing, has now operated daily 10 to 20 hr. for 6½ years without a coil burn-out or any furnace maintenance expense.

Control Atmosphere in Bright Anneal of Copper

Considerable progress has been made in the atmospheric control of electric furnaces for bright annealing of copper. Oil continues to be the fuel of the eastern rolling mills, but electricity is still extending rapidly for annealing seamless tubing, coiled sheets and wire. Recently continuous electric furnaces of the tube type have been built for bright annealing of copper tubing in an atmosphere of steam or some non-reducing gas. Pit-type electric furnaces of the retort type are now in use for bright annealing coil copper sheets in an atmosphere of steam. A properly constructed water-sealed electric furnace has little maintenance expense, as shown by the fact that two

furnaces installed in Waterbury five years ago have operated continuously without coil burn-out or other maintenance expense. It would seem, however, that the continuous tube furnace or the retort pit furnace using steam as an atmosphere has still greater possibilities in reduction of operating cost.

For annealing of nickel-silver stamping, installations of electric furnaces continue to increase, but the use of water-sealed furnaces for this purpose does not seem to be extending as rapidly as formerly in this country. The modern gas continuous belt furnace is being considered for this application, because it is possible to produce as clean a product as in the water-sealed electric furnace at a lower cost, depending, of course, on the local economic situation.

Continuous belt electric furnaces with a seal of burning city gas at the incoming end and a water seal on the other end are now being built, and produce as clean a product as the continuous belt type gas furnace. Both the electric and gas furnace products require some pickling. Further advance has been made in the introduction of the hydrogen-filled pusher type electric furnace which produces an absolutely clean product and eliminates pickling of the nickel-sliver. The further development of the hydrogen furnace has interesting possibilities.

In the annealing of nickel-silver shells electricity has made little progress, because the water-sealed furnaces available up to now are not well adapted to this class of work. Large gas furnaces have recently been purchased for shell annealing, replacing oil, and a considerable number of gas furnaces have been operating very successfully on this class of work for a number of years.

Investigate Overall Costs

IN this discussion of the economics of heat treating I have confined myself to some of the major applications of Connecticut. Possibly I have dwelt more upon electric heat treating than upon the use of fuel. This is because each application of electric heating serves to emphasize the fact that the selection of the source of heat for heat treating is an economic problem involving a study of overall costs. From its beginning in 1889, forty years ago, the application of electric heating to industrial work has proceeded in an entirely logical manner along economic lines in accordance with the requirements of the industrial world.

Three Broad Periods in Electric Heating

Modern civilization could not have reached its present stage of mechanical development without the product of the electric furnace. Electric heating in its developments has passed through three broad periods: 1889 to 1900, electric smelting; from 1900 to 1918, electric melting; and from 1918 to date, what is now called industrial electric heating. Starting with high-temperature processes which can be conducted economically only in the electric furnace, electric heating has progressed through the whole tempereature range of metallurgical and industrial processes down to simple drying and baking at low temperatures. Since the construction of the first metallic resistor electric heat-treating furnaces about 10 years ago, great improvements have been made, so that today the electric furnace is firmly established as a means of heat treating under suitable local economic conditions. It will retain this position only so long as it is applied economically. In any situation if any improvement made in construction of oil and gas furnaces results in the lowering of overall costs, the economic situation will compel the displacement of the electric furnace by these fuel furnaces.

Heat Treating Gains in Importance

Today, more than ever, metal-working industries realize the importance of heat treating in their operations. It is now generally understood to a greater extent than ever before that a comparison of costs of sources of heat on a thermal basis means nothing without a complete investigation of overall costs. Even if such an investigation leads to no change in the source of heat, it is well worth while, because it invariably results in the discovery of little realized weak parts of the plant practice which influence production costs materially. Selection of the source of heat for heat treating is an economic problem, with the final choice depending on the local economics as shown by the overall cost of the finished product with the different forms of heat.

Carnegie Safety Trophy for 1930

COMPETITION for the 1930 Carnegie Steel Co. safety trophy was started Jan. 1. The trophy illustrated is the ninth of the artistic bronzes which have been put into competition annually among the various Carnegie manufacturing plants.

As will be seen from the illustration, this is a miniature rolling mill with housings. It was made of sterling silver by the Gorham Co., New York. The base is of bronze, while flanking the rolls are statuettes of two men representing steel rollers handling the machinery. The men are on considerably larger scale than the mill.

Both figures were posed for the artist by men employed in Carnegie plants, one of them being a roller at Farrell, Pa., and the other a roller at Clairton, Pa. The height of the entire trophy is 28 in. It carries silver plates for engraving the names of the winning plants month by month, and that of the plant winning permanent possession for the year's operations.

Fabricating and Handling Equipment

Unusual Combination of Apparatus for Accurate and Rapid Work—Some Special-Purpose Machines Employed

MATERIALS handling was given utmost consideration in laying out and equipping the fabricating plant of the R. C. Mahon Co., Detroit, which is designed for convenience in handling steel from the time it is received from the mills, and through the fabricating and assembling operations. Efficiency has been increased and labor saved by the installation of latest types of drilling and punching machines with tables controlled by the machine operator, and with other labor-saving methods.

A large extension recently was built to the plant, providing two separate fabricating shops and bays for the storage of steel. The new shop is used for fabricating steel for the heavier types of buildings and the old shop for industrial types of structures. Both are served from the same steel storage department. The two shops are practically the same in layout and wherever possible the equipment is duplicate and interchangeable.

Work can be shifted from one shop to the other when desired. The efficiency of the present arrangement is shown in the output, which is 17.9 tons monthly per man, counting all productive labor, including crane operators.

The two shops are located at right angles and are so arranged that material can be routed readily into either shop. Steel is kept under cover from the time it is unloaded until it is shipped out, except some of the fabricated work from the industrial type building shop. The company plans eventually to cover the crane runway from which some of the material is now shipped.

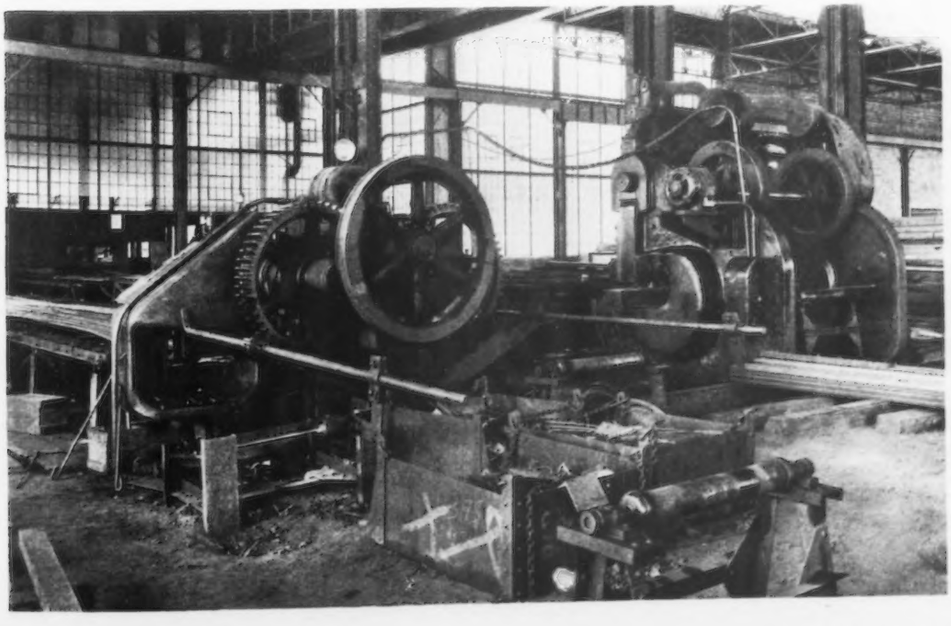
Three 80-ft. bays and one 40-ft. bay, all 380 ft. long, are comprised in the new shop. In addition, a fifth bay for sheet fabrication is located at one side of the shop. The narrow bay along the outer wall is used for bar storage, the second for beam and column storage and the third for storage of angles and plates. Heavy columns and beams are fabricated in the fourth bay, which is L-shaped, the lower end extending around in parallel line with the other structural shop. Here it connects with a covered loading dock, 80 x 140 ft., which serves both shops. Railroad tracks serve the new shop, spanning the bays in the form of a curve, and one track extends along the loading dock.

Warehouse orders are handled at the lower end of the beam and column storage bay, for the company does a jobbing business in addition to fabricating. Here warehouse stock is cut and classified and shipments are made through doors at the side of the plant, so that the handling of warehouse material does not interfere with production.

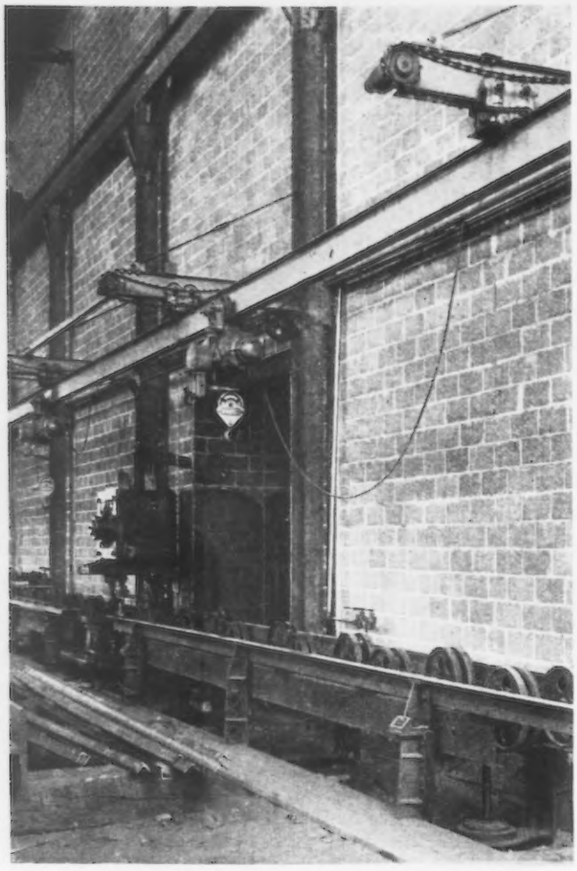
Across the end of the four main bays is a transfer bay for handling steel from the storage bay to the heavy fabricating shop. Each bay is served by two electric traveling cranes, these ranging from 15 to 30-ton capacity. Cranes used throughout the plant are of the two-hook type.

Cutting equipment is located at the lower end of the new storage bays. Here steel is cut to length for warehouse orders or for either of the fabricating shops, so that when it reaches one of these shops it is ready for fabrication. One crane unloads the stock from the cars to the shear and the other handles it after cutting. In the assembly department are two 25-ton cranes for handling and loading assembled work.

Fabricating for industrial-type buildings is done in a shop 336 ft. long and 80 ft. wide. The industrial shop has three 10-ton cranes, one for each gang. At the end of this shop is a 25-ton crane for loading. At the side of the



ONE of the Sets of Plate and Angle Shears. These are mounted on turntables for convenience in operation



PIECES Which Are Single and Through Punched Are Handled to and from the Punching Machines by Electric Hoists Operating on a Monorail Adjustable Laterally by the Punch Operator. The monorail is carried forward and backward on trolleys moving on short I-beam sections reaching out from the side wall

shop is a 50-ft. bay for doing miscellaneous work not suited for production in the main shop.

Slabs, which are used mostly for column bases, are cut with a torch. Beams and columns are cut with a torch or a Ryerson friction saw; from this they go to either of the fabricating shops or to the warehouse. If they are to fill a warehouse order directly, a crane delivers the steel from the conveyor table of the saw to a truck for shipment.

The shear table is of the gravity type and has stops so that work can be measured on the table. It will handle sections 80 ft. long. Four-fifths of the cutting on beams and channels is done with torches instead of saws.

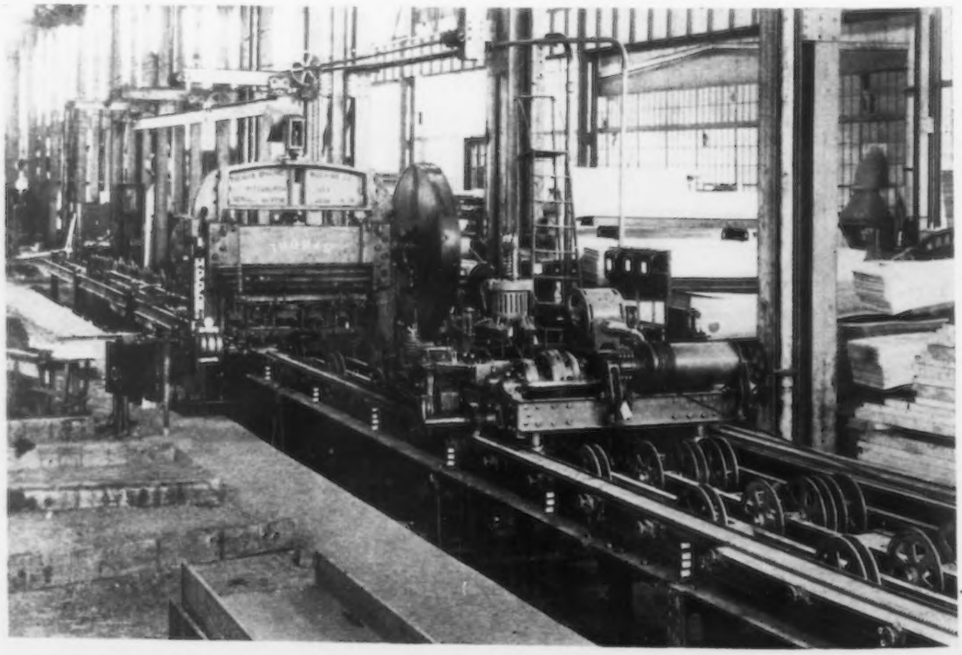
Plates are sheared on a Bertsch & Co. shear and angles on a Ryerson-Kling shear. Plates are delivered to the shear on a gravity conveyor table. The shear is mounted on a turntable, permitting it to be placed in any position for bevel cutting and ripping, the plate always remaining in a horizontal plane and at right angles to the normal setting of the machine. The advantages for this arrangement are that, during ripping, plates always go through the shear in a straight line and plates can be squared on the table without the use of a squaring shear. A set of guides on the conveyor table holds the plates in alinement.

The angle shear is similarly provided with a gravity conveyor and turntable. This shear differs from the plate shear in that it has two blades independently operated, one being used for regular production and the other on detail work. The plate shear will handle 84-in. plates 1 in. thick, and the angle shear angles up to 8 x 8 x 1¼ in. There are two sets of the plate and angle shears, one set located in the plate and angle bay, which is used mostly for shearing warehouse stock, and the second set at the entrance to the shop for industrial types of buildings.

Handling Steel During Punching

An efficient method of handling material through the punches for single and through punching, when no spacing table is used, is provided in the industrial building shop. A monorail adjustable laterally is located over the punches along the wall. This is supported by short horizontal I-beam sections projecting from the building columns, which serve as a rail for the trolleys to which the longitudinal monorail is attached. The longitudinal monorail is a 10-in. I-beam.

This is moved forward or backward by chain-operated trolleys through controls located on the machine. The punching machine operator moves the monorail to the position required to bring the work in alinement with the machine. The steel is handled on electric hoists suspended from the monorail. The machine operator has complete



LIGHT Columns and Angles Punched on a Multiple Punching Machine. The carriage on the spacing table is controlled by the machine operator through solenoid brakes

MACHINE for Facing the Ends of Columns. The blades are on the large disk head back of the holding-down bridge (at right)

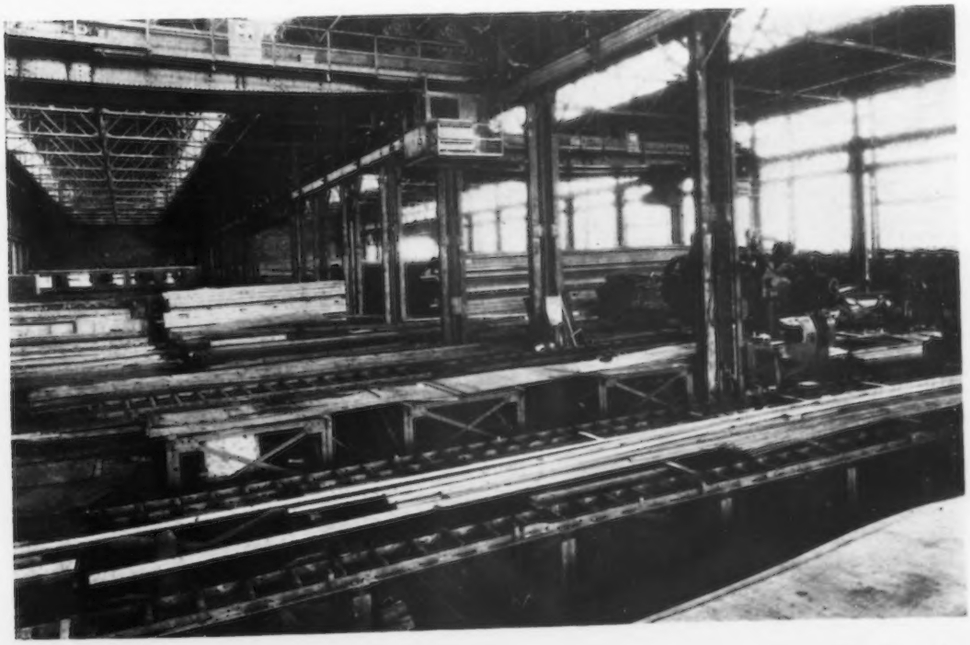
H-COLUMNS and Heavy Angles Are Drilled on a Multiple Drilling Machine, with a Turn-over Table Controlled by the Machine Operator Through Push Buttons and Levers (Above)

control of the piece and can handle a beam up to 80 ft. long. Work is held by the hoists during punching. With the movable monorail track, single and through punching is done by two men—the punching machine operator and a helper.

Multiple punching of light columns and angles is done on closed-throat multiple punching machines with automatic spacing tables, built by the Thomas Spacing Machine Co., Pittsburgh. These will punch up to 36-in. beams, and both the flange and web can be punched with one set-up, or a flat or an upright piece can be punched on the same template. The travel of the carriage on the table is controlled by the punching machine operator through solenoid brakes.

Turn-Over Table for Drilling H-Columns

Drilling of H-columns and heavy angles is done with a Baush multiple drilling machine. This is provided with a Thomas turn-over table which centers the column being drilled to the drill head by means of chucks, each having two fingers that hold the piece in place and work automatically, except for a final close adjustment. The table has



GRAVITY Conveyors Are Employed for Handling Materials Locally in the Warehouse

push-button and lever controls, all handled by the machine operator, for travel as well as for raising and lowering the work, which is accomplished by automatic screws.

Both flanges and webs can be drilled without taking out the piece. Work is handled to and from the table by jib cranes. The table will handle the largest H-sections and pieces up to 55 ft. long. Ends of columns are faced on a new type facing machine built by the Thomas Spacing Machine Co.

Work is riveted with Hanna riveting machines hooked to electric hoists on Gantry cranes, which have a runway extending the length of one of the assembly departments. The hoist is suspended from a monorail on the gantry crane, allowing a 6-ft. transverse travel. The electric rivet heater is mounted on the carriage of the crane, so that it is always at the side of the riveter, and its operator controls travel of the crane as well as passing the rivets.

Centrifugal Pipe Increasingly Used

Output Rises Although Total Pipe Tonnage Shows Little Change—Easier Money Expected to Improve Municipal Buying

CENTRIFUGAL pipe production last year occupied an increasingly important position in the total cast iron pipe output. It is estimated to have contributed 500,000 tons to the total, compared with an estimate of 425,000 tons in 1928, 400,000 tons in 1927 and only about 200,000 tons in 1926. Production of both pit cast and centrifugal pipe is estimated at slightly less than the 1,315,198 tons in 1928, which was smaller than the 1,437,698 tons of 1927, and a further slight decline from the peak year of 1926, when production reached 1,534,278 tons.

The year has been one of the poorest business years experienced by the pipe industry since the war period. Although the mileage of pipe laid was undoubtedly greater than indicated by the tonnage of sales, there was an unusually heavy demand last year for large sizes of pipe, ranging from 20-in. to 48-in. Throughout 1929, inquiries including a substantial tonnage of large diameter pipe were not uncommon. The largest single pipe order, and for the largest sizes, was placed by Albany, N. Y., which bought 39,700 tons of 42 and 48-in. water pipe.

Buying on Smaller Scale

With few exceptions, municipal and private purchases were smaller than usual. Detroit, however, maintained its lead as an important municipal user of cast iron pipe with a total for the year in excess of 30,000 tons. This was surpassed only by the Albany, N. Y., contract, but was nearly equalled by Dallas, Tex., with about 30,000 tons for the year. New York, usually a large consumer, bought only about 15,000 tons. Private users bought sparingly, compared to their requirements in past years. The Federal Water Service Co., New York, and the United Gas Improvement Co., Philadelphia, each bought about 10,000 tons of pipe, the American Light & Traction Co., which removed its purchasing division from New York to Chicago in the spring, closed on about 20,000 tons and the American Water Works & Electric Co., bought about 15,000 tons.

Prices Lower in Northern Market

Prices fluctuated much less than in previous years, but were remarkable in that quotations of Birmingham district producers, usually lower than in the North, because of lower raw material and labor costs, were maintained several dollars a ton higher. This developed from a keen competitive situation among Northern makers.

Exports Widely Distributed

Export of pipe was generally limited to small lots, but widely distributed with shipments going to consumers in Mexico, Cuba, Hayti, Porto Rico, Dutch West Indies, Brazil, Argentina, Chile, Russia, Japan and all the Central American countries except Guatemala. The heaviest export buying was by the Philippines, which placed orders for about 15,000 tons of pipe, ranging from 4-in. to 42-in. Importation of pipe was even less a factor than in 1928, when the total for the year declined to about 65,000 tons from 81,764 tons in 1927.

New Plant Construction Limited

The Warren Foundry & Pipe Co., Phillipsburg, N. J., and the leading shipper of foreign-made cast iron pipe to the United States were the only companies to project new construction and they made but little progress with their plans. The Société Anonyme des Hauts Fourneaux et Fonderies de Pont-a-Mousson of Pont-a-Mousson, France, decided to establish an American plant, undoubtedly influenced by the proposed increase in the duty on cast iron pipe recommended in the Smoot-Hawley tariff. Property was acquired at Chelsea, Mass., and construction was begun on a dock and a railroad siding. A foundry with 150,000 tons annual capacity is planned for construction this year.

About the same time, the Warren Foundry & Pipe Co., which had been considering establishment of a sand-spun centrifugal pipe plant in the New England district acquired property at Everett, Mass., adjoining the Mystic blast furnace, filled the low ground, and at the end of the year contracted with the McClintic-Marshall Co. for a foundry with about 35,000 tons a year capacity.

Centrifugal Rights Sold Abroad

World capacity for centrifugal pipe production registered further increases. The Sand Spun Pipe Corporation, licensed two British foundries and the leading French producer of cast iron pipe to operate under its patents. In Canada, a Hamilton, Ont., pipe foundry, licensed in the fall of 1928, entered into full production of sand-spun pipe.

A development of the year in pipe production was the beginning of manufacture of 18-ft. lengths of centrifugal pipe by the leading interest, marking another forward step from the 12-ft. sections made up to about 1914. Experiments were conducted by a Florence, N. J., producer of centrifugal pipe, operating under the sand-spun patents, in an effort to cast large diameters centrifugally up to 48-in.

Better Business Foreseen for 1930

As the year ended, foundries were still in need of tonnage and only maintained a low rate of operation in most cases. However, a moderate tonnage of private inquiry from gas and water companies appeared during the final month, municipal inquiry showed renewed activity, and with prospects of an easier bond market in 1930, which should permit of municipal borrowing at lower interest rates than has been possible during 1929, pipe producers foresee the possibility of a considerable improvement in business for 1930.

Die Casting Moves Toward Stability

Interchange on Information, Organization of Die Casting Institute, Extended Study of Die Cast Test Pieces, Are Factors Which Improve the Outlook

BY HARVEY A. ANDERSON*

Harvey A. Anderson

DIE casting as an industry is making steady progress on the road toward stabilization. This method of manufacturing identical parts in large quantities at low cost has achieved its greatest advance during the past year in the standardization of certain alloy compositions. When Charles Pack defined die castings in 1914 before the American Institute of Mining Engineers as "metal castings made by forcing molten metal under pressure into a metallic mold or die," the industry possessed very few plants and the operators considered their major assets to be their exclusive possession of the knowledge of how to cast parts successfully of the desired size and shape. Today we have a considerable number of producers cooperating in the recently organized American Die Casting Institute, and both producers and consumers are pooling their knowledge of alloys suitable for die casting through a large committee of the American Society for Testing Materials.

Die casting, as a method of production, is an extremely competitive business. On the one hand it must replace forgings and metal stampings by effecting savings in the cost of machining and frequently also in the cost of obtaining the required surface finish. On the other hand, it must justify the expense of a large investment in machines and dies by offering economies over sand castings, slush castings, and permanent mold castings. Therefore die casting is essentially an industry suited to the production necessities of a country where the consuming capacity for such things as automobiles, radios, vacuum cleaners, electric washers, telephones, adding machines and typewriters is as extensive as it is in the United States. Europeans, when advised of the economies of the die casting process, immediately inquire what could be done with the rest of the week's output of a machine capable of producing ten thousand speedometer cases in one ten-hour day. In America the consuming capacity is sufficient to justify the cost of multiple dies and die casting machines which make such high production rates possible.

The pressure die casting process is comparable with automatic screw machine production in its replacement of man power by ingenious machine design. It has been aptly stated that the extent to which difficult shapes can be successfully die cast is only limited by the ingenuity of the die designer. The possibility of obtaining accurate sizes and shapes with accurately cast threads, numerous cores and inserts of various materials for bearings or magnetic parts illustrates the possible labor saving inherent in this process.

Secrecy Giving Way to Cooperation

In the annual review published in THE IRON AGE one year ago, Sam Tour emphasized the fact that secrecy practised by the producers of die castings was hindering their progress. The signs of the times point to a growing conviction among these same producers that they will gain a great deal more than they give by the exchange of information on minor developments and particularly on the type of mistakes which are costly to the entire industry. This comparatively young industry has seen a large number of producers bankrupt and considerable hand-to-mouth existence of survivors. Among the factors contributing to these failures are unintelligent bidding, neglect of proper cost accounting, lack of skill in die design and insufficient metallurgical plant control. On the other hand, the business of certain outstanding producers is exhibiting a healthy growth with only such interruptions as may be expected from the operation of normal business cycles. One producer has increased his plant capacity four fold during the past year and the general outlook of the industry is decidedly hopeful for the coming year. The number of large users of die castings who are installing die casting departments of their own is steadily increasing and the larger die casting companies appear in general to be ready either to supply die casting machines or completed die castings wherever there is a demand.

The American Die Casting Institute under the presidency of Charles R. Murray has selected the matter of accurate cost estimating as one of its first major subjects for study. This institute is making an effort to substitute intelligent competition for cut-throat competition between producers. Among the proposals looking to this end is one that wherever possible business be allocated to that producer which stocks a die for the proposed part. This proposal has the merit of seeking to eliminate the duplication of expensive dies but has been criticised because the numerous other factors involved in production may give a competitor a real advantage over the die casting company which stocks the die in question. The proposal is open to the further objection that the present membership of the Die Casting Institute does not include a number of the larger producers in the industry. This illustration is cited to show the lines along which the Institute is working.

Accumulation of Precise Information on Castings

The success of the Die Casting Committee of the American Society for Testing Materials seems already assured by the large amount of work which it has accomplished with the enthusiastic cooperation of its sixty members, representing producers, consumers, the Govern-

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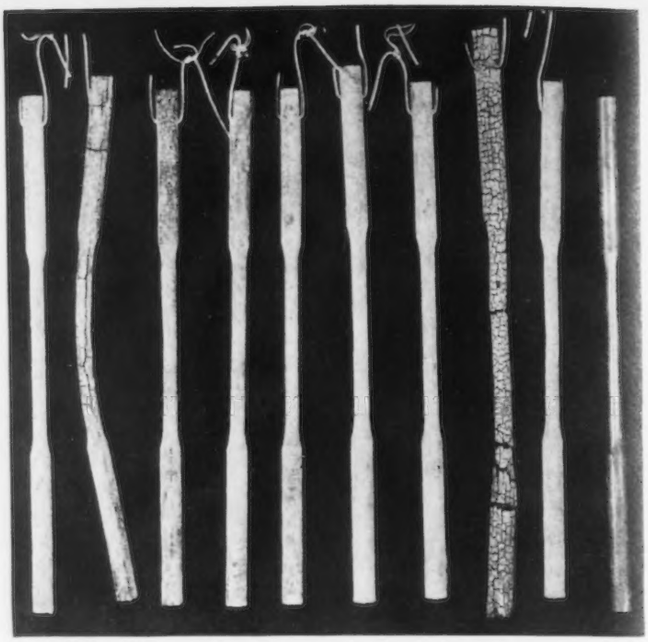
ment and technical societies. The committee will prepare specifications for aluminum and zinc base alloys suitable for die casting after having made a sufficient number of tests to acquire the necessary information. The largest producers indicated their willingness to cooperate in certain researches (which offered promise of general improvement throughout the industry) by designating their technical men for committee members and furnishing nominal analyses of the alloys in which they produced the largest tonnages.

Twelve aluminum base and nine zinc base alloys (Table I) were first selected as being representative of preferred practice or as representative of new developments of the company, which is prosecuting most active research in this field (e.g. the New Jersey Zinc Co.). Nine producers have cast the various alloys into test pieces and have distributed the specimens shown in Fig. 1 to fifteen testing laboratories.

The total number of specimens produced for physical, chemical and corrosion studies is between 80,000 and 100,000 and about 30,000 of these have been tested and the information circulated among the committee members. This has resulted in the accumulation of a mass of information about variation in composition and properties of simple die castings (that is, test specimens) as produced under the diverse methods employed in various manufacturers' plants. Table II and III give some average results from one of the testing laboratories.

Virgin Metal Essential for Quality Castings

One of the practical features of this investigation has been to demonstrate that producers of die castings must use virgin metals to obtain definite alloys. Aluminum alloy die castings pick up some iron from the casting machine, and if, in addition, the manufacturer attempts to use secondary metal which contains a considerable amount of impurities, the resulting alloy is decidedly different from the nominal composition. The committee's investigation on the zinc base die casting alloys has demonstrated that the presence of small amounts of tin, lead and cadmium is seriously detrimental to the permanence of the die cast parts under humid conditions. Striking proof of this is given in the accompanying half-tone, a photograph of die cast specimens of zinc alloys corroded in the steam tank (the one at the extreme left is an unexposed test piece). Such rapid tests are being compared and correlated with atmospheric exposure tests at several locations from Boston to the Panama Canal Zone.



Specimens of Zinc Base Die Castings After 20 Days in Steam Test at 95 deg. C. The alloys are XIII to XXI (from left to right) and the one at the extreme right represents the size and shape of the specimens as cast

Where die cast parts are used because of their cheapness and only approximate limits are required on size and shape, the composition may properly be left to the producer, but large consumers now insist on getting parts which have definite size, strength, soundness, machinability and freedom from deterioration in the presence of moisture, oil and elevated temperatures. To produce such castings requires a knowledge of the effect of both composition and casting technique, but in many cases, the selection of an alloy suited to the consumer's needs is a subject on which few, if any, of the producers are qualified to advise fully.

Table I.—List of Alloys Investigated With Nominal Compositions

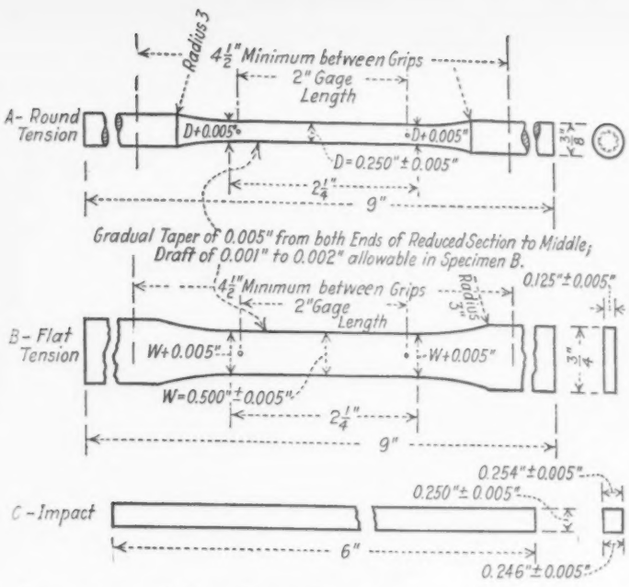
Alloy [a]	Copper, Per Cent	Silicon, Per Cent	Nickel, Per Cent	Iron, Per Cent	Aluminum, Per Cent
Aluminum-Base Alloys					
No. I	4.0	..	..	1.5 to 2	remainder (94)
No. II	10.0	..	..	1.5 to 2	remainder (88)
No. III	14.0	..	..	1.5 to 2	remainder (84)
No. IV	..	5.0	..	1.5 to 2	remainder (93)
No. V	..	13.0	..	1.5 to 2	remainder (85)
No. VI	2.0	3.0	..	1.5 to 2	remainder (93)
No. VII	4.0	5.0	..	1.5 to 2	remainder (89)
No. VIII	1.5	0.75	2.25	1.5 to 2	remainder (94)
No. IX	4.0	1.5	4.0	1.5 to 2	remainder (89)
No. X	..	2.0	5.0	1.5 to 2	remainder (91)
No. XI	2.0	8.0	..	1.5 to 2	remainder (88)
No. XII	8.0	1.0	..	1.5 to 2	remainder (89)

Alloy [a]	Copper, Per Cent	Aluminum, Per Cent	Magnesium, Per Cent	Tin, Per Cent	Zinc, Per Cent	Grade of Zinc Based on A.S.T.M. Specification B 6-18
Zinc-Base Alloys						
No. XIII	5.0	0.25	..	..	remainder (94.75)	High Grade
No. XIV	3.0	4.0	..	..	remainder (93.0)	High Grade
No. XV	3.0	4.0	0.1	..	remainder (92.9)	High Grade
No. XVI	3.0	4.0	0.1	..	remainder (92.9)	Special High Grade [b]
No. XVII	3.0	3.0	0.3	..	remainder (93.7)	High Grade
No. XVIII	3.0	0.5	..	6.0	remainder (90.5)	Prime Western
No. XIX	2.0	4.0	0.1	..	remainder (93.8) [d]	Special High Grade [b]
No. XX	3.0	4.0	..	..	remainder (93.0)	Special Grade [e]
No. XXI	3.0	4.0	0.1	..	remainder (92.9)	Special High Grade [e]

[a] This identification number and the manufacturer's mark cast on each specimen.
[b] Special grade, lead and cadmium together, permissible maximum, 0.06 per cent; tin, none; zinc, minimum 99.94 per cent.
[c] Slab zinc analyzing at least 99.75 per cent zinc.
[d] Containing nickel 0.02 per cent in addition.
[e] Special grade, lead and cadmium together, permissible maximum, 0.02 per cent; tin, none; zinc, minimum 99.99 per cent.

Expansion in Output Will Come From Better Understanding of the Alloys

The correctness of this statement is attested by a carburetor manufacturer, who has been unable to find any alloy which will satisfactorily eliminate corrosion troubles. Furthermore, the engineering department of a high-priced automobile manufacturer testifies that difficulties encountered with variations in die castings have resulted in the temporary abandonment of die cast parts. On the other hand, numerous other automobile manufacturers are extending the use of die castings and several of them have advised the committee that they intend to bring their specifications in line with the committee's recommendations as soon as these are published. Similar difficulties have been reported by manufacturers of cash registers, radio and telephone apparatus and there appears to be no question but that the general adoption of die cast parts in many other industries is awaiting dependable knowledge of alloys possessing desirable char-



Dimensions of Test Pieces Die Cast in 21 Alloys for the Present Investigation

acteristics with suitable forms of short time tests to insure that these requirements are met.

More High Purity Zinc Will Be Used

The American Society for Testing Materials committee's findings on the improvement in permanence of zinc base alloys with a total impurity content of 0.06 per cent or less has contributed to the development of sources for such pure metal for which the commercial demand was formerly very limited. The Tainton process for obtaining high purity zinc is being exploited actively and other large producers report that similar pure slab zinc can be obtained by methods which have been newly developed. One of the largest die casting companies advises that no slab zinc of a purity lower than 99.99 per cent will be used in their plants during 1930.

Developments which appear certain in 1930 include the more extensive use of zinc of a purity higher than the standard electrolytic grade (99.90) to insure permanence in die castings, better plant control to avoid contamination of alloys (particularly zinc base alloys of the four-per cent aluminum three-per cent copper type), the more extensive use of die castings under conditions where their general performance must be known with the certainty which can only be assured by accurate knowledge of the composition, the production of larger and more complex die cast parts, acquisition of more information about proper methods of plating die castings, and control of the soundness of die castings by X-ray examination as an index of proper die design. It is possible that die cast brass parts—which are reported to be in production in Germany—will be successfully introduced into England and the United States.

Zinc Versus Aluminum Die Castings

Aluminum alloys are somewhat more expensive than zinc from a metal standpoint, pound for pound, but the difference is not so great on the basis of volume. The chief reasons for the higher cost of aluminum die castings—which offer certain marked advantages from the standpoint of weight, freedom from deterioration, and finish—have been the higher casting temperatures, requiring the use of alloy steel dies, and the rapid solution of iron from the die casting machine by the molten aluminum. Developments now in progress in America indicate that such difficulties may be overcome by the use of improved alloy steels or nitrided dies and machine parts. Rumors have it that the machines used in Germany for brass die castings have markedly superior and more resistant materials in the metal pot as well as in the dies. Any improvement of this sort will permit higher casting pressures with consequent improvement in soundness.

Table II.—Tests on Aluminum-Base Alloy Die-Cast Specimens from Producer A Made at Navy Yard, Washington

Alloy	Average Tensile Strength, Lb. per Sq. In.		Average Deviation of Individual Tensile Strengths, Per Cent		Minimum Tensile Strength, Lb. per Sq. In.		Average Elongation in 2 In., Per Cent		Average Rockwell Hardness "E" Scale (Red Figures) on Flat Specimens		Average Impact, Charpy, Ft.-Lb.	Tensile Fractures		
	Flat	Round	Flat	Round	Flat	Round	Flat	Round	Gate End	Vent		Sound Metal	Blow-holes	Through Fillets
No. I	19,014	27,920	12.9	2.4	15,050	27,050	1.7	5.2	51.7	49.2	5.2	11	1	2
No. II	32,030	34,210	6.3	2.5	29,600	33,350	2.9	2.9	75.9	74.3	2.9	16	0	1
No. III	34,950	37,350	4.5	5.1	31,000	32,950	1.2	1.3	91.7	87.6	1.6	7	3	1
No. IV	28,690	29,000	3.0	1.5	26,750	28,400	3.8	3.9	60.6	59.6	4.5	10	0	0
No. V	33,228	32,960	6.7	4.7	29,800	29,400	1.2	1.2	85.8	85.3	1.4	8	2	2
No. VI	26,280	28,430	3.7	0.9	24,350	28,050	2.5	3.0	64.6	62.3	3.2	9	1	0
No. VII	29,620	33,830	3.9	3.4	27,250	32,450	2.5	2.8	76.2	72.2	2.6	7	3	0
No. VIII	28,120	29,850	4.3	2.3	25,100	28,250	5.0	6.0	63.5	63.2	4.1	8	2	0
No. IX	28,410	32,600	2.5	2.6	26,850	30,500	0.90	1.0	89.3	86.5	1.3	7	3	1
No. X	29,090	31,040	2.3	2.6	28,100	29,350	2.0	2.4	74.1	73.2	2.7	8	2	0
No. XI	30,010	34,010	7.2	3.2	26,100	31,850	1.8	2.7	78.6	75.7	2.6	6	4	0
No. XII	30,560	32,660	2.8	2.8	28,800	31,350	1.9	2.6	77.5	73.4	2.9	9	1	1

Table III.—Tests on Zinc-Base Alloy Die-Casting Specimens from Producer B Made by Wright Field, Dayton, Ohio

Alloy	Average Tensile Strength, Lb. per Sq. In.		Average Deviation of Individual Tensile Strengths, Per Cent		Minimum Tensile Strength, Lb. per Sq. In.		Average Elongation in 2 In., Per Cent		Average Rockwell Hardness, "E" Scale (Red Figures) on Flat Specimens, Gate End	Average Impact, Charpy, Ft.-Lb.	Tensile Fractures
	Flat	Round	Flat	Round	Flat	Round	Flat	Round			
No. XIII	27,860	28,000	3.43	8.94	26,520	22,980	0.5	0.6	85.9	0.9	2 in blowholes
No. XIV	41,940	44,640	2.95	2.67	38,850	41,650	0.8	2.0	97.5	3.2	1 in blowholes
No. XV	47,380	49,530	5.87	5.52	43,270	45,830	1.2	1.4	97.4	3.3	All good breaks
No. XVI	49,380	48,590	5.05	3.71	46,870	46,130	1.0	1.9	99.2	4.9	All good breaks
No. XVII	34,690	39,310	7.89	2.77	28,520	38,200	0.5	0.5	97.4	1.5	1 in blowholes
No. XVIII	24,090	28,570	3.28	4.51	22,420	26,700	0.9	1.0	72.3	1.7	All good breaks
No. XIX	43,360	48,150	3.73	5.50	40,550	45,030	1.7	2.1	95.5	6.1	All good breaks
No. XX	36,800	40,960	6.01	0.96	31,800	40,500	0.5	1.0	96.0	2.3	3 in blowholes
No. XXI	48,530	47,820	1.45	0.78	47,600	47,000	2.0	1.9	97.3	8.2	All good breaks

Designing Ingots for Good Surfaces

Importance of Corners Stressed, in Examination of Action of Liquid Steel in Mold and Plastic Steel in Rolls

INGOT quality is of primary importance in every phase of steel production, since upon the quality of the ingot depends the quality of the finished product and, finally, the satisfaction of the user. The production of good-surface blooms is the particular problem of the mill man, however, since he must get out maximum tonnages at minimum cost. If the ordinary rectangular ingot is not carefully rolled, however, its surfaces will be overstressed and torn in the initial reduction passes in the mill. Either costly chipping or excessive rejections is the result.

To appreciate how much the design of a mold influences the quality of the ingot surface, it is probably necessary to review what happens when molten metal is teemed into a mold and while it solidifies, and the effects of the rolls on the solidified casting. What follows was prepared on the basis of the experience of Emil Gathmann,* Gathmann Engineering Co., Baltimore.

Initial skin solidification of an ingot, which occurs immediately upon contact of the molten ingot metal with the relatively cold walls of a mold, results in very fine crystals. A somewhat different type of dendrites of larger crystallization, having the fine skin crystals as their nucleus, grow into the body of the ingot metal quite rapidly until contact between mold and ingot is broken.

During the initial ingot contraction the mold chamber has contracted also. Hence the metal is tightly gripped, and the conduction of heat from ingot to mold at this period is very rapid. In this way the ingot skin is quickly formed. The conduction of heat from ingot to mold continues until the mold walls are heated throughout, when the mold chamber is enlarged by expansion of the mold as a whole. Then the mold pulls away from the ingot, so that the burden of the weight of the entire mass of metal must be held by the thin skin which solidified during the contraction of the mold chamber. This is what might be called the critical stage in solidification, for, unless the mold contour has been properly designed, the surface of the ingot in yielding to the pressure of the metal will be overstressed and will break, causing bleeding blisters or runouts.

A mold chamber is corrugated for the purpose of increasing its perimeter and to provide more salients, so that the initial skin will solidify quickly and the corrugations will resist the tendency of the skin to tear during solidification. This principle is not a new one and is quite generally employed. Fig. 1 shows the first known employment—Mooney patent of 1873, with a single corrugation in the center of each flat face.

Octagon and dodecagon cross-sections (the latter shown in Fig. 2) more nearly met the requirements for good surface solidification than any other of the old types. They have not been more extensively employed because of the serious loss in tonnage output of the mill, due to the necessity of more passes being made in squaring up such an ingot.

Two factors are primarily considered in designing the cross-section of an ingot: The ingot must be free to contract without binding to the mold walls, and the salients and corners of the ingot must be of such angular contour that they will not decarburize in the reheating pits. These two requirements are generally recognized and are met in the greater number of designs in use today.

Another requirement of the greatest importance in the production of good surface in any grade of steel is this: The primary sides of the ingot must be relatively narrow and must be in a higher plane than the corner salients of the ingot, so that, in the initial deformation in the rolls, the corner salients will receive very little work and the adjacent unworked sides will not be appreciably stretched in a longitudinal direction.

Unless one remembers that the ingot, when placed in the rolls, is merely a chill casting having a coarse crystalline structure which lies in planes at right angles to the direction of rolling, the reason for this requirement is not obvious. But, until the ingot surfaces have all been

*President, Gathmann Engineering Co., Baltimore, who has done much research work on the effect of ingot cross-section on the surface quality of blooms and billets.

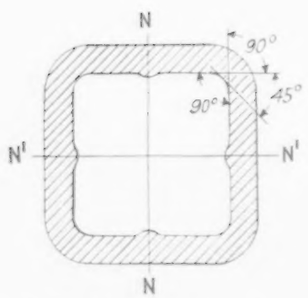


Fig. 1. Earliest Record of a Rectangular, Corrugated Mold Chamber—Mooney Patent 1873

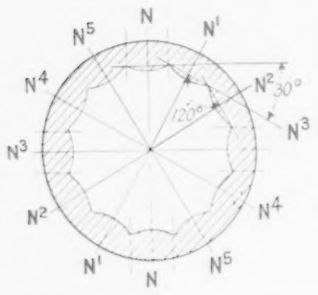


Fig. 2. Round Dodecagon Corrugated with Sharp Salients. Widely used for special steels

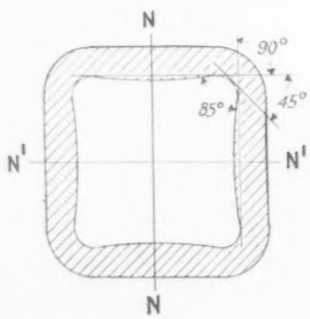


Fig. 3. Early Type of Rectangular Mold Corrugated with Narrow Corners

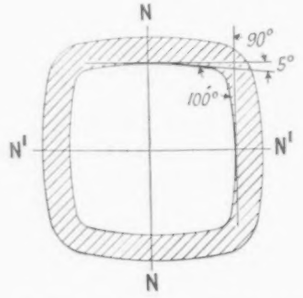


Fig. 4. Good Corner Construction, But Design Otherwise Extremely Bad

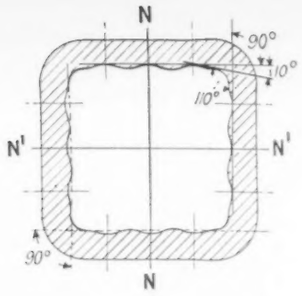


Fig. 5. Improvement Over the Early Forms of Rectangular Corrugates — Primary Surfaces Too Wide and Corners Too Short (1917)

worked in the rolls and the size of the crystals reduced, no appreciable elongation is permissible. When the ingot is elongated before the rolls have acted on all of its surfaces, open cracks or sub-skin seams, sometimes both, are present in the bloom.

In some products the open cracks can be chipped out, but sub-skin seams cannot be eliminated by any amount of work. They are frequently not found unless the product is etched and closely examined. Sometimes the material, due to growth of these seams under repeated stress, fails below its elastic limit.

A rectangular corrugated design in wide use is shown in Fig. 3. This design has four inwardly-bellied side walls, which allow moderate adjustment of the ingot skin during solidification, providing the rise of the arc is very small. Unless special rolls are provided, the sharp corners will frequently overlap in bloomering and cause defects in the surface.

Another widely used design, Fig. 4, is the antithesis of Fig. 3. The initial set of the skin is bowed outwardly and cannot adjust itself to the initial contraction and subsequent expansion of the mold chamber during solidification. Numerous shrinkage cracks and incipient stresses are necessarily formed in the skin of such an ingot during solidification, but the corners are broad enough so that there is no danger of decarburizing in the reheating pits or overlapping in mill reduction.

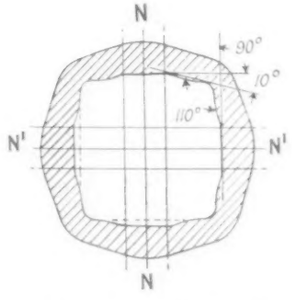


Fig. 6. This Cross-section of Ingot Solidifies Without Stress and Rolls Without Overlapping at the Salients

Broad corners which will not lap readily in moderately light rolling passes appear in the rippled design in Fig. 5, but the free sides are seriously stressed during the initial passes. This is caused by the width of the primary sides, which cannot spread in a sidewise direction and must elongate the ingot, overstressing the unworked sides.

Two cross-sections which have come into wide use within the past several months are shown in Fig. 6 and Fig. 7.

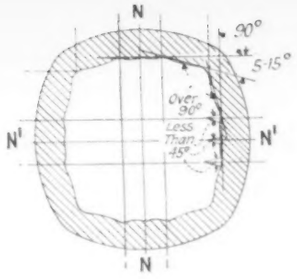


Fig. 7. Variation of the Gathmann Principle Having Rippled Primary Faces

They were originated and have been patented by Emil Gathmann, and embody what he considers the necessary features for good surface in both big-end-up and big-end-down tonnage practice. Thus, the lines connecting the corners of the mold matrix are so corrugated as to offer no obstruction to free contraction of the metal toward the neutral lines of shrinkage. Owing to the corrugation of the secondary corners, the ingot surface is flexible and can give without breaking or cracking during the period of separation of mold and ingot subsequent to the expansion of the mold. The corners are broad and are not apt to be burned in the reheating pits or lapped in rolling operations.

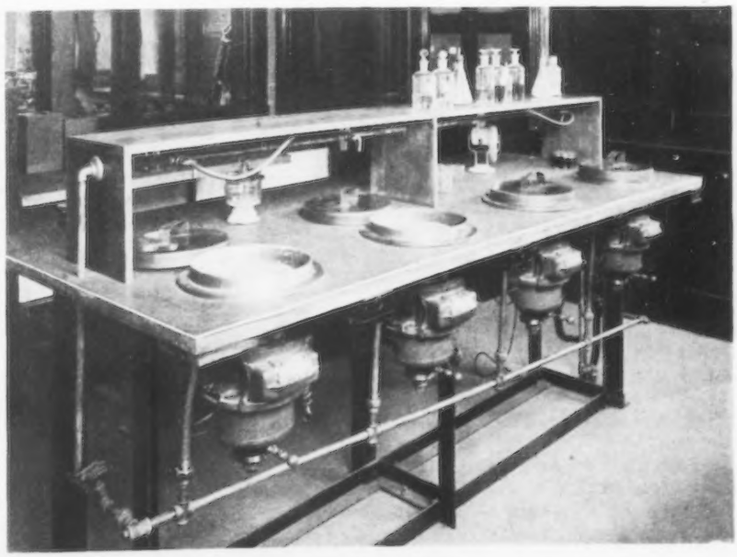
In the initial passes the projecting primary sides of an ingot of this type are spread in a direction approximately parallel with the axis of the rolls, rather than flowed longitudinally, as happens when the primary sides are wide and in substantially the same plane as the corners. The free, unworked adjacent sides are thus not elongated and are deformed only slightly, if at all.

Improved Metallographic Polisher

NUMEROUS essentials for fine and rapid work are contained in the "Cincinnati" metallographic polishing machine, manufactured by Cincinnati Electrical Tool Co., Cincinnati. Primarily it is a well built ½-hp. electric motor, with vertical shaft mounted on ball and roller bearings. Mounting and general construction is such that the noise and vibration are absent, smooth running characteristic being especially valuable to those who must scratch-free surfaces rapidly with ordinary laboratory workers.

All ranges from high speed and high power (for rapidly smoothing large sections for macro examination) to low speed (for high polish on small pieces of soft metal) are provided by simple switch and lever control. If 60-cycle alternating current is used, the standard Cincinnati machine is capable of various speeds from 800 to 2000 r.p.m.; 110 or 230-volt direct current motors have a 600 to 3000 r.p.m. range. Even lower speeds are provided the latter by an armature control, installed to order.

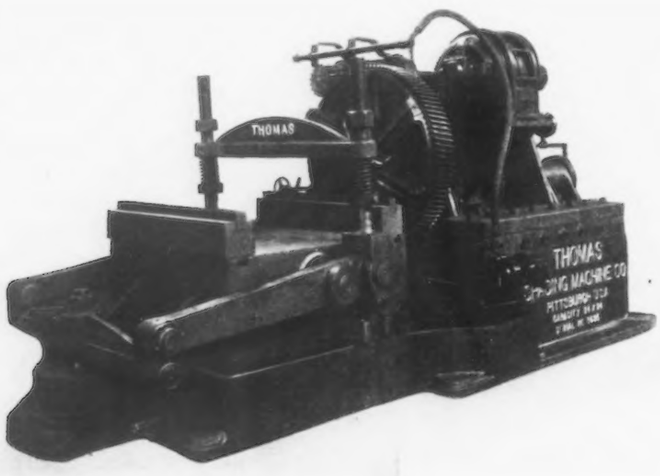
Another feature built into this polishing machine is a bronze pan with cover (for protection against dust when idle), and with a high lip and ample diameter to prevent splashing even at highest speed.



Improved Column Facing Machine

Air Clamping of Work and Oilgear Hydraulic Feed Are Features

A LINE of column facing machines incorporating new and improved features has been introduced to the structural steel fabricating trade by the Thomas Spacing Machine Co., Pittsburgh. Except for the air supply, the machine is entirely self-contained, occupying a minimum of floor space. The particular unit illustrated has a 40-in. diameter cutter head and will face up to 24 in. square.



Column Facing Machine Having a 40-In. Diameter Cutter Head and Capacity for Facing Up to 24-In. Square. Work clamping is rapid and positive. The hydraulic feeds provide unlimited range to suit various materials to be machined

A double-headed machine, with one head stationary on the foundation and the other movable on rails, can be furnished for facing both ends of a column simultaneously to accurate lengths.

For rapid setup and a secure grip on the work, an air clamp is used. The clamp is practically instantaneous in action and exerts uniform holding pressure. The swinging arrangement of this clamp allows the work to be lowered through the clamp to be swung over it on the bed, thus facilitating material handling on and off the machine.

Oilgear feed is used to actuate the cutting mechanism, allowing an unlimited range of feeds to suit the requirements of the material being machined. For production work a plate is provided on which may be marked the various control lever positions for different feeds on the various materials. Another graduated plate is supplied with a movable stop which may be set to stop the carriage automatically at any predetermined point. This plate is adjustable to care for the wear in blades due to grinding.

The cutter head is driven through a helical gear which is cut directly on the head itself. This eliminates chance of torsional vibration which would be set up if the head were driven through a shaft. The head is supported by a heavy forged shaft steel mounted in Timken tapered roller bearings.

A new arrangement of cutting blades gives a shear cut and is said to diminish the load on the head by approximately 75 per cent. This gives a fast and clean cut with minimum vibration. Nine blades are used; these may be removed from the head, and an extra set, furnished with the machine, may be inserted in five or six minutes. A grinding jig is also supplied to facilitate resharpening the sets of blades. A motor-driven cooling pump is standard equipment. All motor control equipment is mounted directly on the machine at the operator's station.

New Expansion Reamer

THE Conradson Tool Corporation, 2116 Indiana Avenue, Chicago, has placed on the market an expansion reamer consisting of the company's reamer with cast body and the expansion arbor here illustrated. The high-speed steel blades are cast solid in the body of the reamer, which is standard except that its flutes are slit as shown. As pointed out in our previous description of this reamer, casting of the body of the tool is claimed to lower the cost of manufacture some 25 to 50 per cent with consequent savings to users.

Adjustment in size is made by means of a ground threaded taper plug in the end of the arbor. One or two turns of the plug brings the tool to size, after which the blades may be trued up quickly on a tool grinder. It is not necessary to remove the reamer from the arbor. The range of expansion is from 0.015 to 0.025 in., according to the size of the reamer, which is made in several sizes from 1 3/16 to 3 in. The arbors are of standard size and may be used with solid reamers.

The reamer blades extend beyond the body to permit facing the bottom of the hole being reamed. The flat surfaces of the rectangular blade are emphasized as permitting uniform heat treatment, which assures high cutting efficiency. The special alloy body of the tool is said to carry off heat more rapidly than steel, and thus favor faster cooling of the blades, which under these conditions retain their cutting edge longer and permit increased production through use of higher speeds. It is also claimed that the body of the tool, in being tough and resilient, cushions the blades against shock and vibration and thus increases the cutting efficiency and prolongs their life.

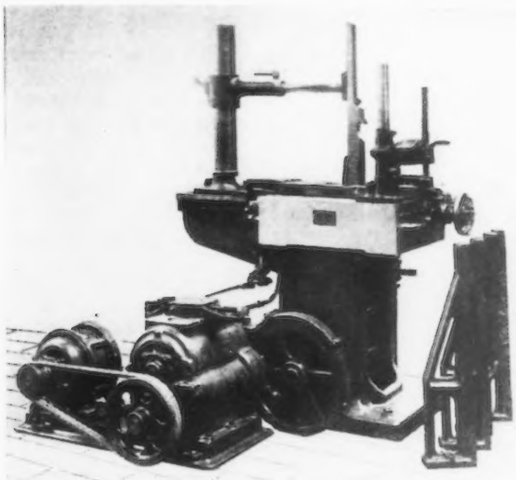
Cobalt Steel Drills

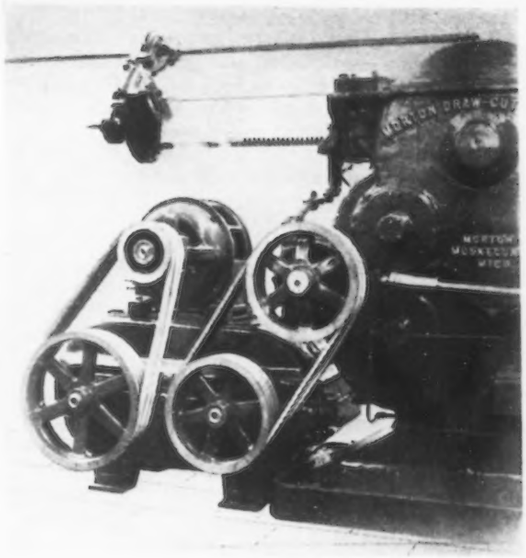
CIRCLE C cobalt steel drills for drilling unusually hard and tough materials have been placed on the market by the Morse Twist Drill & Machine Co., New Bedford, Mass. Higher speed and longer life, with increased production, are claimed for these tools, which, with Morse taper shank, are made in a wide range of sizes from ⅛ to 1½ in. Straight shank drills from ⅛ to ½ in. are also stocked.

For facing refractory brick used in the melting furnaces of a large plate glass company the Gardner Machine Co., Beloit, Wis., is building a special grinding machine, one of the largest ever made by the company. The machine has a 40-in. grinding wheel, weighs 35 tons, and is 36 ft. long and 8 ft. high. It is automatic in operation.

Size Adjustments Are Made with the Reamer on the Expanding Arbor

The Morton Reversing Drive Applied to a Keyseater Is Shown Below, While the Variable-Speed Unit Attached to a Draw-Cut Shaper Is at the Right





Drive Units for Morton Shapers and Keyseaters

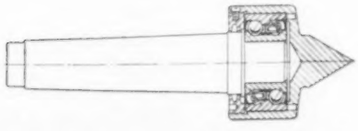
THE Morton Mfg. Co., Muskegon Heights, Mich., has placed on the market a variable-speed transmission adapted especially for its high-duty draw-cut shapers but applicable also to other motor-driven machine tools. The device provides an unlimited number of speeds, and it is possible to get a 3 to 1 speed range. Speed changes may be made while the machine is in operation by means of a handwheel within easy reach of the operator. The cutting speed in ft. per min. is shown on a speed indicator that is within view of the operator at all times. A Reeves drive unit forms part of this transmission.

A direct-connected reversing drive unit for application to the company's keyseating machines having 18, 24, 38 and 48-in. cutting stroke has also been developed. This unit is of box-type construction and incorporates powerful multiple-disk clutches geared to give a 2 to 1 quick return ratio. It is self-lubricating, the clutches running in oil, and the shafts are mounted on Timken bearings. This reversing drive unit eliminates the countershaft and belts usually furnished with these stationary keyway cutters. It is direct connected to the machine by means of a flexible coupling; it is positive in its reversal.

Ball-Bearing Live Center for High-Speed Tools

A BALL-BEARING equipped tailstock live center for machine tools having the high speeds necessary for the economical use of tungsten-carbide cutting tools has been placed on the market by the Ready Tool Co., Bridgeport, Conn. By providing rigid and non-deflecting support for the work, this new live center minimizes detrimental chatter and vibration at the cutting edges of the tools.

Rigid and accurate support of the work under all load and speed conditions is attributed to the design of the New Departure double-row bearing employed. This angular contact bearing has solid, high-carbon chrome steel inner and outer races and is assembled so that the two rows of balls are opposed in a definitely preloaded condition. When the center is set up, the work is brought close to the tailstock proper so that the inherent rigidity of the bearing is not offset by deflection of other parts, which would result were there considerable overhang. Another feature is that the housing closure or seal is located on the side opposite the work, and is therefore protected from direct force of the cutting compound. The rotating housing also helps to keep lubricant in, but throws compound and chips away from the bearing seal.



Rigid Support of the Work Is Afforded by the Double-Row Ball Bearing Employed

In this center, the ball bearing is so mounted that the outer race rotates with the nose of the center. The nose or point is ground after assembly and therefore runs true. Regrinding of the nose is infrequently required, but if necessary it may be accomplished readily without removing the center from the machine, since the nose may be driven by a belt around the bearing housing while a cut is taken with a small grinder adjusted to the angle of the point. The bearing used requires no lubricating attention or adjustment of any kind by the user. It is manufactured in the commonly used taper sizes, but tapers of any type or size can be made to order.

Portable Electric Hand Saws for Crating and Other Uses

TWO new electric hand saws are being produced by the Speedway Mfg. Co., Cicero, Ill. One, designated as the type 183, carries a 12-in. blade and cuts 4⅜ in., and the other, the type 184, has a 10-in. blade and cuts to a depth of 3⅜ in. The 12-in. saw carries a 1-hp. General Electric motor and runs at a no-load speed of 1750 r.p.m., while the 10-in. machine is equipped with a ¾-hp. 1800-r.p.m. motor. Both motors are universal.

Features include a slipper plate base which can be raised or lowered for adjustment of depth of cut, and an automatic swinging saw guard. The latter pushes back out of the way when cutting pressure is applied and returns to guarding position when the pressure is released. An arrangement for holding this guard in the sawing position is also provided. The upper part of the saw blade is covered with a cast aluminum guard, the side cover of which is conveniently removable

Adjustable Slipper Base Plate and the Automatic Saw Guard Are Features

for changing saw blades. The guard structure will not collect sawdust.

Ball bearings are used throughout, and all gears and shafts are made from chrome-nickel steel and are heat treated. Spur and bevel gears are used instead of the usual worm gearing. All gears and bearings are packed in grease, the supply being sufficient for several months.

Saw blades are mounted on the left-hand side of the machine to provide maximum visibility for the operator. On both machines a ripping guide is mounted on the front of the slipper plate to facilitate long cuts. Both models are equipped with a D-type handle which is adjustable to two positions. Motor cases, handles and slipper plates are of cast aluminum. The weight of the smaller saw is 25 lb. and of the larger, 28 lb.

New Rigidmil Adapted for Use of Special Heads

A HIGHER column, permitting greater flexibility in the use of special heads; a saddle of larger proportions and an increased minimum power feed travel are features of the new No. 3-W Rigidmil which is being manufactured by the Sundstrand Machine Tool Co., Rockford, Ill.

Two throat distances are provided, that is, the distance from the spindle column to the center of table. This construction makes possible the mounting of special heads on the spindle column for milling on large or cumbersome pieces of work without sacrifice of the table working surface.

Power feed and rapid traverse to the table in both directions are controlled through a single lever located on the front of the machine. Trip blocks at front of table automatically disengage the feed or rapid traverse. Rapid travel is set at 102 in. per min. Automatic table control can be provided which will return the table to the starting or loading position, automatically, at the completion of the cut. It may be operated to return from either direction by using either right or left-hand trip blocks.

The spindle is forged from selected steel and is carried in Timken roller bearings front and rear. It has the National Standard nose with hole $2\frac{3}{4}$-in. diameter at large end and $3\frac{1}{2}$-in. taper per ft. The entire spindle assembly is carried in a steel quill hardened and ground, 6-in. outside diameter and having $3\frac{1}{2}$-in. traverse adjustment. A flywheel on the spindle sustains the smooth power flow delivered by the spiral gear spindle drive. The overarm is a solid steel forging, rectangular in shape and unusually rigid. The overarm construction lends itself readily to the application of special cutter heads and other devices for securing maximum output.

General specifications are: spindle speeds, 17 to 241 r.p.m.; table feeds, 1.9 to 21.4 in. per min.; motor, $5\frac{1}{2}$ to 7 hp. at 1200 r.p.m.; total column height, $32\frac{1}{2}$ in.; shipping weight, 6200 lb.; and, floor space, without motor drive, 48 in. x 110 in. for the 34-in. feed and 48 in. x 125 in. for the 48-in. feed machine.

Double-Arbor, Two-Motor, Universal Saw

A DOUBLE-ARBOR universal saw, featuring individual direct-connected motor drive for each blade, has been added to the line of J. A. Fay & Egan Co., Cincinnati.

Two 14 or 16-in. blades are carried on arbors mounted, with their motors, on a revolving frame set in a turned seat in front of the column. To "change" blades it is necessary only to turn a handwheel, which swings the desired saw into cutting position and lowers the other out of sight. The built-in push-button magnetic starting unit is so wired that current is supplied to the saw only in cutting position.

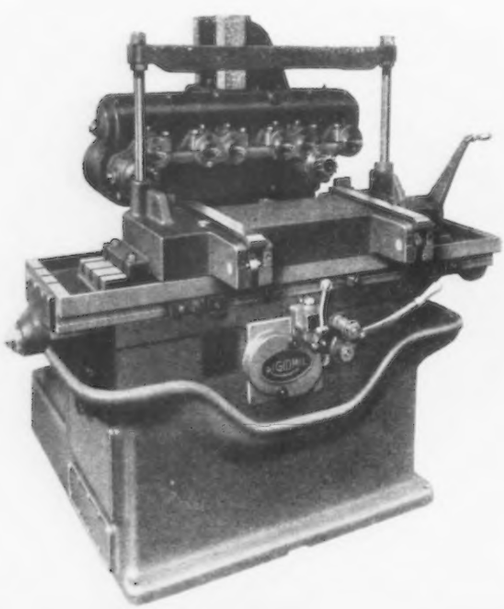
Bevel ripping or miter work can be done by tilting the table, which angles to 45 deg. A sliding segment is incorporated in the top for wide cut-off work, in addition to the regular cut-off guides which slide in ways, past the saw, and are adjustable for miter cutting. A rip fence which tilts for gaining may be purchased separately.

Four-inch lumber can be worked with 16-in. blades, and a 3-in. cut or groove can be made with 14-in. blades, which are stock equipment. Dado heads of either diameter can be used up to 2 in. in thickness. Sawdust chute and flange for blower union are cast integral with the bed. The machine is ball bearing throughout, including a countershaft housed in the main member for the application of outside power. Where cuts deeper than 4 in. are required one 20-in. blade can be mounted. Saws are removed from below the table by means of a plate which is hung on pins.

Sharp Drop in Weekly Factory Earnings

Average weekly earnings in representative New York State factories in November are reported by the State Industrial Commissioner at $29.54. This is the smallest reported figure since that for August, 1928, at $29.38.

It compares with $30.08 in October, 1929, and with $29.62 in November, 1928. The drop from October was almost 2 per cent and from the peak of $30.47, reached in September, was a little more than 3 per cent. The figures include all employees in both office and shop.



The Rigidmil with Higher Column to Permit Greater Flexibility in Applying Special Heads Is at the Left

* * * *

At the Right Is Shown the Double Arbor Universal Saw, Arranged So That Ripping and Cross Cutting Can Be Done Without Changing of Blades

Plans of Airplane Companies for 1930

Good Many Have Only Recently Got in Production and Expect to Increase Output This Year

IN response to inquiries from THE IRON AGE, a number of manufacturers of airplanes and airplane engines have announced their production plans for 1930, and have also given data regarding recent expansions of plants and facilities. Information from their letters is briefly summarized in the following paragraphs:

Solar Aircraft Co., Ltd., San Diego, Cal., has been engaged during the past year in the design and construction of an all-metal transport plane. The company will be ready for volume production in the early part of 1930. A plant expansion of about 3000 sq. ft. is contemplated.

Edo Aircraft Corporation, College Point, N. Y., manufacturer of standardized all-metal seaplane floats, delivered about 200 of these floats during 1929. The company says that its own figures indicate that sales of seaplanes in 1929 increased more than fourfold, as compared with 1928, and it looks for a further increase during 1930.

Nicholas-Beazley Airplane Co., Inc., Marshall, Mo., is now equipped for the manufacture of five airplanes a day. It started production last August of the Barling NB-3 plane and has been working on the schedule of about 200 planes a year.

American Cirrus Engines, Inc., has recently moved from Belleville, N. J., to a much larger plant at Marysville, Mich., where it has purchased buildings formerly owned by the Wills Ste. Claire Automobile Co.

Dayton Airplane Engine Co., Dayton, Ohio, produced 25 engines in 1929 and contemplates production of 1200 engines in 1930. The company expects to add about 75,000 sq. ft. of floor space, but plans are delayed until the outlook in the airplane industry is more certain.

Paramount Aircraft Corporation, Saginaw, Mich., produced nine airplanes in 1929 and contemplates production of 35 in 1930.

Aero Supply Mfg. Co., Inc., College Point, N. Y., has, in recent months, installed about $100,000 worth of new machinery in its College Point plant, and this plant has been enlarged by an addition of about 8000 sq. ft. of floor space. The plant of a subsidiary, the National Steel Products Co., Dayton, Ohio, has been enlarged about one-third and new machinery has been installed. The Standard Automatic Products Co., Corry, Pa., another subsidiary, contemplates engaging in the manufacture of precision parts for airplane motors.

Mohawk Aircraft Corporation, Minneapolis, Minn., was engaged in experimental work during the past year and is now ready for production, and contemplates an output of 100 two-place planes in 1930. Its capacity is four planes a week.

Pitcairn Aircraft, Inc., Willow Grove, Pa., has recently completed a new factory and regular production has been started.

Guardian Aircraft, Inc., Moberly, Mo., is ready to engage in production of light two-place airplanes and expects to produce about 350 during 1930. The company will erect a new factory building, 100 x 300 ft.

Command-Aire, Inc., Little Rock, Ark., manufactured 225 airplanes last year and expects to produce 300 this year.

LeBlond Aircraft Engine Corporation, Cincinnati, produced about 300 radial air-cooled engines last year is tooled up for an output of five a day.

Warner Aircraft Corporation, Detroit, produced 400 engines last year and is planning for an output of 1000 during 1930. During the past year the company quadrupled its floor space, now having about 30,000 sq. ft.

Browning Aircraft Co., Gary, Ind., expects to get in production by midsummer on a two-place sport biplane. W. B. White is president.

Driggs Aircraft Corporation, Lansing, Mich., has been engaged in experimental work during the last year, but expects to produce about 200 airplanes this year.

Davis Aircraft Corporation, Richmond, Ind., produced 30 planes in 1929 and expects to build 125 in 1930. The company recently moved from Portsmouth, Ohio, into a modern plant of much greater capacity.

Towle Aircraft Co., Inc., 261 St. Albins Street, Detroit, produced two all-metal amphibians in 1929 and expects to build six in 1930.

Emsco Aircraft Corporation, Downey, Cal., has built a new plant and airport during the past year and contemplates further expansion within the next 60 days. The company is now building several planes, including one with capacity for 32 passengers and another with capacity for 35 passengers.

Crawford Motor & Airplane Mfg. Co., Inc., Seal Beach, Cal., built 25 power gliders in 1929 and contemplates a large expansion of output this year.

Bach Aircraft Co., Inc., Van Nuys, Cal., produced 20 tri-motor transport planes in 1929 and expects to expand its output to 48 planes this year. It now occupies a building having 40,000 sq. ft. of floor space.

Marchetti Motor Patents, Inc., San Francisco, has recently expended $55,000 on buildings and equipment and $35,000 on a private airport, and expects to spend $25,000 additional for plant expansion. Its contemplated 1930 output is 100 planes and 300 engines.

Ireland Aircraft, Inc., Garden City, N. Y., produced 23 amphibian planes during the past year and expects to produce 50 this year.

Butler Aircraft Corporation, Kansas City, Mo., produced 10 airplanes in 1929 and contemplates an output of 50 in 1930. The company during the past year has completed a new plant adjacent to the Kansas City municipal airport.

Great Lakes Aircraft Corporation, Cleveland, completed 160 airplanes in 1929 and contemplates a production of 500 during 1930. Plant expansion in 1929 included an addition of 20,000 sq. ft. of floor space.

Packard Motor Car Co., Detroit, has recently completed a four-story building, in which it will build its new Diesel aircraft engine. While the company turned out some water-cooled engines during the past year, its activities in aircraft work were largely confined to the development of the new motor.

Lycoming Mfg. Co., Williamsport, Pa., which has been engaged for some time in the development of a new airplane engine, expects to start production about March 1.

Bellanca Aircraft Corporation, New Castle, Del., completed 70 airplanes in 1929 and doubled its floor space to 51,000 sq. ft.

Aircraft Products Corporation, Detroit, manufacturer of landing gears, wire wheels, pontoons, and airplane parts, contemplates producing landing gear and wheel and break units for 6000 to 7000 airplanes during 1930. The company recently moved into a plant with capacity three times that of its former factory.

Noran Aircraft Corporation, Ltd., San Francisco, is planning for an output of 300 planes during 1930.

Stout Metal Airplane Co., Division Ford Motor Co., produced 87 all-metal airplanes in 1929 and expects to produce 125 during 1930. It greatly increased the capacity of its plant in the past year.

Kinner Airplane & Motor Corporation, Glendale, Cal., contemplates an 1930 output of 2000 engines, as compared with 850 in 1929. During the past year the company's factory was increased from 17,000 to 45,000 sq. ft. of floor space.

Welding Society Issues Booklet on Nomenclature

As a result of three years of activity by a committee of the American Welding Society, a 43-page bulletin has been printed covering "Welding and Cutting Nomenclature, Definitions and Symbols." It should be of great value in promoting uniformity in terminology; at the present time there is no common understanding of such common terms as "torch" or "backhand welding." Over 140 figures in the text are required to define the technical terms, and to indicate the proper methods of representation on a blue print. The pamphlet may be secured from the American Welding Society, New York, for 50c.

Foundrymen's 1930 Convention and Show

Largest Exhibition Expected—Technical Program Partly Arranged—Several New Features

SELECTION of the Cleveland Public Auditorium for the thirty-fourth annual convention and the twenty-third exhibit of foundry equipment, machines and supplies of the American Foundrymen's Association, to be held the week of May 12, 1930, was originally made primarily because of its exceptional facilities for housing this annual affair. The auditorium and annex together afford accommodations for practically unlimited exhibit requirements in the way of space and power.

The management and exhibitors are planning to take full advantage of these unusual facilities, and are promising to make the 1930 show the most outstanding foundry display ever held. Cleveland's hotels will accommodate the country's largest conventions, and most of these hotels are within easy walking distance of the auditorium.

Exhibits will be thrown open at noon on Monday, May 12, in both auditorium and annex. The closing hour on Tuesday, Thursday and Friday will be 5 p.m. Arrangements have been made to hold all exhibits open on Monday and Wednesday until 10 p. m.

The exhibitors' dinner is scheduled for Tuesday evening, May 13. Another annual affair is the A.F.A. subscription banquet, to be given on Thursday evening.

An added feature of the exhibit this year will be an educational and technical display, which will be housed in the large closed corridor connecting the auditorium and the annex. This exhibit will contain displays prepared by various committees of the A.F.A. and will include sand testing apparatus, apprentice contest material, exhibits of many engineering schools, castings, refractories and a metallurgical and physical testing laboratory.

Tentative Technical Program

The tentative program for the convention includes sessions on metallurgy, engineering practice, management and practical shop operation. Because of the varied interests of the members and guests attending the meeting, the sessions this year will be organized so as to limit the subjects covered at any one meeting. There will be a sufficient number of sessions, however, to cover all the important phases of foundry practice.

Of considerable interest every year are the informal round-table luncheon discussion meetings, which will again be held at this convention. Three such round-table sessions are scheduled covering malleable, steel and non-ferrous foundry subjects.

The shop operation courses, so popular at the past two annual meetings, will be broadened this year to include a course on the fundamentals of non-ferrous shop practice. In addition, both of the courses held in 1929 on gray iron and steel will be continued. Each course will consist of three or four sessions, beginning at 4 p.m. on the days scheduled.

A number of authors new to A.F.A. programs will read papers on various foundry subjects at the 1930 convention. A partial list of those who have signified their intention of submitting papers, and the subjects to be covered by each, is as follows:

"Electric Gray Iron Melting," B. C. Beach, Beach Foundry, Ltd., Ottawa, Canada.

"Enameling Properties of Cast Iron as Affected by Sands Used," C. J. Scullin, Tucker-Scullin Corporation, St. Louis.

"Use of Briquetted Borings in the Cupola," F. J. Walls, Wilson Foundry & Machine Co., Pontiac, Mich.

"Personnel Training," Dr. Harry Meyer, Frigidaire Corporation, Dayton, Ohio.

"Cleanliness and Neatness of the Foundry as a Business Asset," J. J. Carroll, G. & C. Foundry Co., Sandusky, Ohio.

"Application of Ingot Metal to Production of Brass and Bronze Castings," W. Romanoff, H. Kramer Co., Chicago.

"Effect of Pin Hole Porosity on Properties of Sand Cast Aluminum Alloys," E. M. Gingerich and H. J. Rowe, Aluminum Co. of America, Pittsburgh.

"Heat Treating Cast Iron," F. J. Walls, Wilson Foundry & Machine Co., Pontiac, Mich.

"Carbon and Sulphur Equilibrium in Cupola," J. T. MacKenzie, American Cast Iron Pipe Co., Birmingham.

"Effect of Prolonged Heating at Various Temperatures on Cast Iron," R. S. MacPherran, Allis-Chalmers Mfg. Co., Milwaukee.

"Steel Melting Problems," George Batty, Steel Castings Development Bureau, Philadelphia.

"Factors Affecting Machinability of Malleable Iron," H. A. Schwartz, National Malleable & Steel Casting Co., Cleveland.

"Duplexing Process of Producing Malleable Iron," B. R. Mayne, Saginaw Products Co., Saginaw, Mich.

"Foundry Sand Control from Producers' Point of View," W. W. Kerlin, Enterprise Sand Co., Conneaut, Ohio.

"Gating and Risering of Castings," E. Ronceray, Bonvillain & Ronceray, Choisy-le-Roi, France.

"Wear Testing of Cast Iron," R. M. Allen, American Car & Foundry Co., New York.

"Technical Control of Brass Foundry Mixtures," H. C. Loudenbeck and A. M. Ondreyco, Westinghouse Air Brake Co., Wilmerding, Pa.

"Induction Furnaces for Ferrous and Non-ferrous Foundries," Manuel Tama, Berlin, Germany.

Testing Society's Program for Regional Meeting

A regional meeting, the first to be sponsored by the American Society for Testing Materials, is to be held in Detroit on Wednesday, March 19, under the auspices of the Detroit members, acting under the direction of Vice-president F. O. Clements, General Motors Corporation. The following technical program, designated as a symposium on automotive materials, has been arranged:

"Present-Day Methods in Production and Utilization of Automotive Cast Iron," by A. L. Boegehold, Research Laboratories, General Motors Corporation.

"Sheet Steel for Automobiles," by W. H. Graves, chief metallurgist, Packard Motor Car Co.

"Corrosion-Resisting and Heat-Resisting Steels for Automobiles," by Charles M. Johnson, chief chemist, Park Plant, Crucible Steel Co. of America.

"Advances in Die-Cast Metals and Alloys for Automotive Use," by Charles Pack, consulting chemist.

"Developments in Light Metals and Alloys for Automotive Use," by Zay Jeffries, consulting metallurgist, Aluminum Co. of America.

"Automotive Bearing Metals," by Clair Upthegrove, associate professor of metallurgical engineering, University of Michigan.

"The Significance of Various Tests for Motor Fuels," by R. E. Wilson, head, development and patent department, Standard Oil Co. (Indiana).

"Significant Qualities of Automotive Lubricants," by H. C. Mougey, assistant technical director, Research Laboratories, General Motors Corporation.

"Evolution in Automobile Finishes," by M. J. Callahan, chemical superintendent, Chemical Products Division, E. I. DuPont de Nemours & Co.

"Molded Plastics for Automobiles," by L. V. Redman, vice-president and director of research, Bakelite Corporation.

"Advances in Rubber for Automotive Use," by Walter C. Keys, chief engineer, automotive development department, United States Rubber Co.

"Recent Progress in Tests for Automotive Materials," by H. F. Moore, research professor of engineering materials, University of Illinois.

An informal dinner will close the regional meeting.

The annual spring group committee meetings of the society will be held during the same week, March 18 to 21. All sessions will be at the Book-Cadillac Hotel.

Gray Iron Institute's Regional Meetings

The Gray Iron Institute, Cleveland, has started a series of meetings of foundrymen in foundry centers in the Central Western territory. These will begin with a luncheon and the remainder of the afternoon will be devoted to discussions of various activities in which the institute is engaged and to explanations of the cost system recently prepared for the foundry industry. The first meeting was held at the Cincinnati Club, Cincinnati, Jan. 7.

Other meetings scheduled are Chicago, Palmer House, Jan. 14; Milwaukee, Schroeder Hotel, Jan. 15; Twin Cities, Nicollet Hotel, Minneapolis, Jan. 17; Central Illinois, Pere Marquette Hotel, Peoria, Jan. 25; St. Louis, American Annex, Jan. 28; Kansas City, tentative meeting place, Kansas City Athletic Club, Jan. 31; Iowa, tentative meeting place, Roosevelt Hotel, Cedar Rapids, Feb. 4.

Production Closely Adjusted to Demand

Recession Much Below Normal Not Indicated But Marked Recovery Not an Early Likelihood

BY LEWIS H. HANEY
Director New York University Bureau of Business Research

ONE of the outstanding and most significant facts in the whole industrial situation is the close adjustment between steel production and steel requirements. At no time in many years has the average daily output of steel ingots been maintained in closer relation with the indicated requirements of the nation's consuming industries than has been the case in October and November last year.

A bad case of over-production of steel was threatened in June and July. Since those months, however, there has been such a sharp curtailment on the part of steel makers that their output is almost exactly in line with the potential demand.

We may note, too, that both the composite demand line and the adjusted curve of steel production are only a little above the average for 1921-27, which is taken as the base period. They may have reached that level in December. In 1923 and again in 1927, when recessions carried them to the average level, recoveries occurred. In this fact we may see some ground for hoping that the present readjustment may not require any large or prolonged recession below normal, particularly as the output is so well balanced with indicated requirements that the situation must be relatively free from burdensome stocks of steel.

Such a recovery, if it occurs, however, does not seem likely to be the real beginning of a major upward trend in the steel-making cycle. Not only do our barometers fail to indicate such an upturn, but a common sense appraisal of conditions in the chief steel consuming industries hardly seems to warrant such a conclusion. To begin with, automobile production has not only fallen to low levels, but the existence of rather large dealer stocks of new and used cars, together with the well-supplied position of consumers, makes any sustained revival in the motor trade seem rather remote. Some seasonal pick-up is normally to be expected between January and April, but it is likely that the average person will display a strong tendency to use the old car for another year.

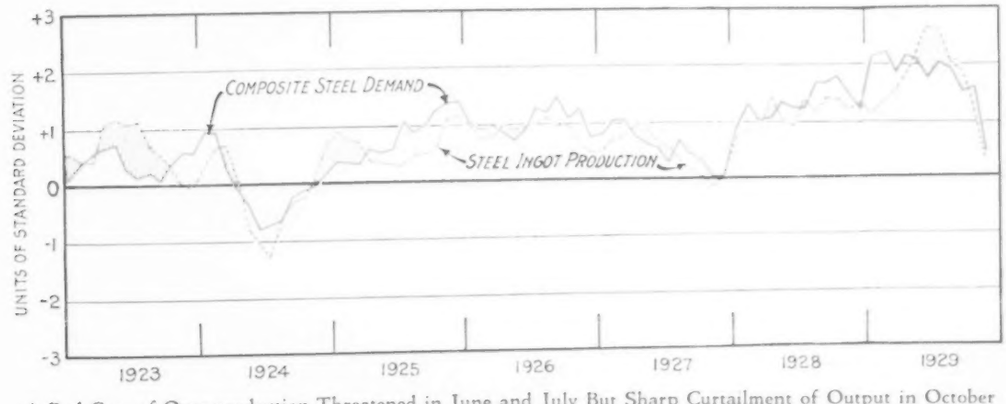
Building activity in November fell to the lowest level since 1924. Indeed, the recession in this field has probably gone nearly as far as is to be expected. Money is fairly easy and a better bond market lies ahead. It is only a question of time before building picks up. But there has been considerable over-building in not a few centers, and there is nothing to indicate a rapid revival in the bond market. While, therefore, the existence of a good many heavy construction programs should insure a fair demand for structural steel during the next few months, the inevitable revival of general building activity seems likely to be postponed at least until the middle of the year.

Railroad freight traffic and earnings are clearly on the downgrade, while the carriers have an ample number of cars and locomotives. Equipment buying in October and November was the best for the season since 1925, and current inquiries indicate no very large recession here.

As to general manufacturing, the best working hypothesis seems to be that it will be rather unfavorably affected by the business recession until about the middle of 1930, though perhaps helped by a temporary upturn in the spring. An unusually sharp drop in machine tool orders in November is to be noted.

November statistics also show one of the sharpest declines in sales of finished steel that is of record, a decline which carried the index to the lowest point reached since 1924.

Next week and practically every week thereafter, Dr. Haney will contribute a summary, such as the foregoing, covering such matters as the outlook in demand and favorable and unfavorable factors in the general business situation.



A Bad Case of Over-production Threatened in June and July But Sharp Curtailment of Output in October and November Brought a Closer Relation with Requirements Than Has Been So in Many Years

This Issue in Brief

Cuts carburizing costs by working at night, when power rate is low. On this basis, electric heat is closely competitive with oil and probably cheaper than coal in certain sections.—Page 149.

* * *

No "temper brittleness" if molybdenum steels are used. They are tough after slow cooling.—Page 142.

* * *

Predicts gain of 11 per cent in building. Authority estimates that 8514 million dollars will be spent in 1930 for building and engineering work.—Page 147.

* * *

Die-casting makers are casting off the veil of secrecy. They are beginning to realize that they will gain more than they will give by exchange of information. A trade association has been formed, but some of the leaders have not yet joined.—Page 155.

* * *

Toughness of medium-manganese steel for carburizing is increased 10 per cent or better by adding 0.25 per cent molybdenum. Uniformity of response to heat treatment is improved, decreasing the number of rejects. —Page 143.

* * *

Critical stage in ingot solidification is reached when heat from the ingot causes the mold to expand and pull away from the ingot. At this point the thin skin on the ingot is supporting the entire mass of molten metal within and, unless the mold has been properly designed, the skin will break and cause blisters or runouts.—Page 158.

When you check your heat-treating costs, beware of the danger of magnifying the importance of B.t.u. cost. Twelve factors go to make up the overall cost, and all must be considered.—Page 148.

* * *

If die castings are to retain their qualities permanently, only virgin metal should be used. Secondary metal usually contains impurities. In addition, aluminum die castings pick up iron from the casting machine.—Page 156.

* * *

Quenched alloy steels containing molybdenum hold their hardness after higher drawing temperatures. Longer times at heat are required to complete the proper reactions.—Page 141.

* * *

Are you using the most economical source of heat for heat treating? Even if an investigation leads to no change in source, it will bring to light little realized weak parts of the plant, which influence costs materially. —Page 150.

* * *

For high shock resistance use steels containing molybdenum, but less than 1 per cent, added to steels containing other common alloying elements, such as nickel and chromium.—Page 141.

* * *

Over half-billion dollars' worth of American machinery exported in first 11 months of 1929. November total was 11 per cent less than October, but 11-month aggregate is 24 per cent ahead of same period of 1928.—Page 207.

Thin-walled stampings or tubing may be made without excessive wear on dies, or undue scrap or rejects, by using molybdenum steel. It cold works easily —Page 142.

* * *

To increase machinability of chromium steels add molybdenum. Brinell hardness and other conditions are not changed.—Page 142.

* * *

For good surface on any grade of steel, the primary sides of the ingot must be relatively narrow and in a higher plane than the corner salients. Thus, when the ingots enters the rolls the corners receive very little work.—Page 158.

* * *

Structural steel fabricator makes savings and gets output of 17.9 tons monthly per man by unusual arrangement of shop. Steel is handled on gravity and monorail conveyors.—Page 151.

* * *

"Single-treatment" carburizing steels resist grain growth even when heated considerably above the minimum temperature required for complete hardening. Coarsened and brittle cores are thereby avoided.—Page 143.

* * *

Production of nitrided parts can be increased if the alloy steel used contains about 0.20 per cent molybdenum.—Page 144.

* * *

Sharp drop in exports of rolled steel for November. Total was 145,191 tons, which was 23 per cent under October. However, 11-month total is 8 per cent above same period of 1928.—Page 205.

Penton Gold Medal Awarded to H. A. Schwartz

Harry A. Schwartz, manager of research, National Malleable & Steel Castings Co., Cleveland, has been selected to receive the 1930 major award of the American Foundrymen's Association, the John A. Penton gold medal. This award, which is made to Mr. Schwartz for his outstanding contributions to the foundry industry, has been approved by the board of awards

H. A. SCHWARTZ

and will be presented him at the 1930 convention the week of May 12.

Mr. Schwartz is especially noted for his many contributions to the field of research on malleable iron. He has been closely identified with the A.F.A. for many years as a contributor of papers, as a member and chairman of various committees and as chairman of convention sessions. One of his papers was the 1928 A.F.A. exchange paper to the Association Technique de Fonderie de France.

At present he is chairman of two important committees of the malleable division, namely, those on specifications and on recommended foundry practices. He also represents the A.F.A. on committee A-7 of the American Society for Testing Materials on malleable iron, and on the ferrous metals committee advisory to the United States Bureau of Standards.

In addition to his membership in the A.F.A., Mr. Schwartz is a member of the American Society of Mechanical Engineers, American Society for Testing Materials, Society of Automotive Engineers, American Institute of Mining and Metallurgical Engineers—serving as vice-chairman of the Northern Ohio chapter in 1924-1925—the American Society for Steel Treating, the Iron and Steel Institute (British), the American Chemical Society—serving as the first secretary of the Indianapolis chapter—the research committee of the Malleable Iron Research Institute and the Cleveland Engineering Society. Mr. Schwartz is the author of the outstanding book on malleable iron, the first edition of "American Malleable Cast Iron" being published in 1922.

At present he is serving as a special lecturer on the metallurgy of cast iron at the Case School of Applied Science, Cleveland. In recent years the company with which he is connected has been producing steel castings, and he has been doing research work on alloy steels, especially in connection with wear and oxidation-resisting products.

His formal technical training was obtained at Rose Polytechnic Institute, Terre Haute, Ind., where he received three degrees—Bachelor of Science in 1901, Master of Science in 1903 and Mechanical Engineer in 1905. He also served as instructor at this institution in 1901-1902, and has retained an active interest in the school.

Dr. Gillett on American Research Laboratories

An address on "Facilities for Metallurgical Research" will be presented by Dr. H. W. Gillett, director, Battelle Memorial Institute, Columbus, Ohio, at the January meeting of the New York chapter of the American Society for Steel Treating, Monday evening, Jan. 13, at the club rooms of the Building Trade Employers' Association, 2 Park Avenue, New York. It will be illustrated with views from representative laboratories of the country.

Steel Institute Will Meet May 9

The next meeting of the American Iron and Steel Institute will be held May 9 and not later in the month as is usually the case. Presumably there will be morning and afternoon sessions and a banquet in the evening and probably the Commodore Hotel, New York, will be headquarters.

Steel Founders to Meet Jan. 28 at Chicago

The January meeting of the Steel Founders' Society of America, Inc., will be held at Hotel Sherman, Chicago, on Jan. 28. The program will include a discussion of new applications for cast steel recently discovered. Examples of how assembled parts have been successfully cast as a unit or where steel castings have been employed in the place of weaker or less durable material for specific purposes will be presented.

On the day preceding the general meeting there will be a meeting of the cost committee, which will devote the entire day to the work of perfecting uniform cost-finding methods for steel foundries. In addition, there will be a meeting of the board of directors and three group meetings—for manufacturers of large and small steel castings and a special division of the society devoted to the producers of heat, acid and corrosion-resisting metal products.

Repair or maintenance costs will be thoroughly discussed at the meeting of the Small Castings Division. A paper on this subject will be presented by C. A. McDonald, Nugent Steel Castings Co., Chicago, and a summary of actual maintenance costs for the various group members will be studied and analyzed.

The society's committee on industrial research hopes to have a revised set of Standard Trade Customs ready to present to the board of directors and the members at this meeting.

Program for Steel Treaters' Semi-Annual Meeting

Arrangements have been completed for the semi-annual meeting of the American Society for Steel Treating to be held Friday and Saturday, Feb. 7 and 8, at the Hotel Pennsylvania, New York. Seven technical papers have been announced as follows:

"Nickel Alloy Steel Forgings," by Charles McKnight, International Nickel Co., New York.

"Effect of Chromium Additions to Manganese Structural Steel," by A. B. Kinzel, Union Carbide and Carbon Research Laboratories, Long Island City, N. Y.

"A Study of the Grain Structure in Martensite," by E. C. Bain and K. Heindlhofer, United States Steel Corporation Research Laboratories, Kearny, N. J.

"A Study of the Nitriding Process, Part II—The Simultaneous Introduction of Nitrogen and Carbon," by V. O. Homerberg and J. P. Walsted, Massachusetts Institute of Technology, Cambridge, Mass.

"Recent Developments in Normalizing Sheet Steel," by Edward S. Lawrence, Duraloy Co., Pittsburgh.

"Some Notes on Sheet Metal and Strip Steel for Automobile Bodies," by Joseph Winlock and George L. Kelley, Edward G. Budd Mfg. Co., Philadelphia.

"Metal for Vitreous Enameling," by J. H. Nead, American Rolling Mill Co., Middletown, Ohio.

Meetings of the board of directors, the recommended practice and publication committees will be held on Thursday, Feb. 6. The finance committee will meet on Feb. 5 to prepare a budget for the coming year.

Foundry Meeting at Dayton

The Ohio Foundries Association will hold a sectional meeting in Dayton, Feb. 6. Material handling in small foundries will be discussed by W. B. Marshall, Chain-Belt Co., Milwaukee; advances in non-ferrous foundry practice, by A. A. Grubb, metallurgical engineer, Columbus, and the Ohio Foundry Code, by A. H. Kramer, president, Advance Foundry Co., Dayton.

The bi-monthly examination of the books of companies subscribing to the Amalgamated Association of Iron, Steel and Tin Workers discloses that the rate on bar iron for the next two months will be unchanged at 2c. a lb.

A. I. FINDLEY
Editor

THE IRON AGE

W. W. MACON
Managing Editor

ESTABLISHED 1855

Price Slashes and Business Recovery

THE metal-working industry looks forward hopefully to steady improvement in business, but it is clear that reckless price cutting would not accelerate such expansion, and might easily retard it. To attempt, through price concessions, to obtain more than one's usual share of the amount of business available is to invite retaliation. A "live and let live" policy is more rational.

Demoralized markets would be expected if the past year had seen price inflation, but under present circumstances they are not warranted and would cause the postponement of the very projects that are counted on to tide business over the current transition period.

Price stability has nothing in common with "price fixing." Manufacturers are no longer under the illusion that price agreements insure profits. They realize only too well from their experiences in 1929 that volume, rather than price, is the key to high earnings. Long ago they learned the folly of restricting markets by keeping prices too high.

It is now commonplace for the benefits from increased efficiency to be quickly passed on to the consumer. The most recent striking example of this fact in the steel industry is the rapidity with which economies in wide strip production were shared with buyers. Such developments, however, can take place in an orderly fashion, in sharp contrast with the disrupting influence of price cutting without regard for cost.

Our Unimpaired Earning Power

THERE is something to be explained in the statement of Col. Leonard Ayres, of the Cleveland Trust Co., that the greatest single burden business "must bear this winter and next year is the making good of the shrinkage of four and one-half billions of brokers' loans that has taken place in the past few months." He adds that in bull markets a large part of the increase in brokers' loans represents profits taken by successful speculators, which stimulate business, while the shrinkage of such loans in bear markets represents losses of unsuccessful speculators and has a depressing effect on business.

The common idea is that the expansion of stock market loans means strained credit, tighter money, and an increasing burden on business and that the liquidation of such loans tends to reduce the strain on bank credit and to bring easier money, thus facilitating an ultimate restoration of normal business conditions.

The statement that brokers' loans measure the losses of the unsuccessful speculator is open to question. What the margin trader puts up with his broker is not the loan, but the "margin." Money that is borrowed is well secured and it is the broker's business to see that it is not endangered by the trader's operations. As soon as the trader's margin is exhausted, the loan is withdrawn.

During any stock market cycle, large quantities of securities are held through both the rise and fall of prices without being transferred. Many people see paper profits accumulate and disappear. Some large investors boast that they never sell stocks.

It is probably true that the rise and fall of paper values is highly significant as affecting business conditions. As the paper value of one's holdings increases, he becomes buoyant in sentiment and tends to spend more freely. Likewise, as the value of one's holdings shrinks during a bear market, he is depressed by the decline in value.

At the peak, last year, brokers' loans were reported by the Stock Exchange at $8,500,000,000. If we assume that margins averaged about 40 per cent, this makes the total amount of the margined speculative account equal to about $14,200,000,000. Subsequently, brokers' loans fell to $4,000,000,000. We do not know what the average margin percentage is now, but if we figure it as still 40 per cent, we get a total speculative account of $6,666,000,000. This would make the actual amount of money lost by the unsuccessful margin traders in the New York Stock Exchange alone equal to upward of $7,500,000,000. And whatever the true amount may be, we must add the losses of those who were financed directly by banks, and of outright purchasers, and we must take into consideration the psychological effects of the great shrinkage in paper values.

Whether it was four and one-half billions or more than the seven and one-half billions that the successful speculators made, why shouldn't they keep on spending freely in the way he says they were? The fact is the "successful speculators" along with the unsuccessful ones were in the market when the crash came. Nothing is said about the spending power of the great multitude of holders of securities who were not among the active traders in the 1929 market. They certainly feel poorer than they were, when they counted many of their stocks to be worth 100 to 200 points, in some cases, more than they are worth today. Their income from these securities has not diminished but their scale of expenditure is likely to be tinged with conservatism because their wealth, as determined by market values, is less.

The whole matter simmers down to this, as was

said in these columns on Dec. 12, in discussing our national income:

> The fundamental things in our national economy are our earnings and our thrift. We are certain that nothing has happened to impair our earning capacity. We may reasonably expect that our earned income in 1930 will be as large as in 1929 unless there be some adversity of nature that no one can foretell.

Prices of Farm and Other Products

IN the last three years prices of farm products and their manufactures have sustained the general commodity level, while in the last seven years, since the beginning of 1923, they have mitigated the decline which would otherwise have occurred. These and other facts are brought out by an original analysis of the statistics of the Department of Labor, made by Morris A. Copeland and published in the Federal Reserve Bulletin for December. Mr. Copeland linked the numerous price series in a new way, making up three separate groups, each composed of raw materials and their finished products; the first group is farm products and their manufactures, the second mineral and forest products and their manufactures, and the third crude imports and their manufactures.

The conclusions Mr. Copeland stresses are:

> (1) The wholesale price level since 1922 has moved chiefly in response to changes in the prices of raw materials.
>
> (2) The price movements chiefly responsible for these changes in the wholesale price level are in those industries where the volume of output of raw materials is not closely or quickly adjusted to conditions of demand; namely, in domestic agriculture, and in bituminous coal, petroleum, rubber, sugar, coffee and silk industries.

These conclusions are interesting and informative, but they deal primarily with fluctuations and their causes, rather than with the general swing. All such studies of details in price movements are helpful, because there is altogether too much tendency to glance at the general price indexes of the Bureau of Labor Statistics and other compilers and make inferences as to what is occurring in trade at large, when what may be called the resolution of forces may come from opposing and partly balancing influences of quite diverse sorts.

In addition to Mr. Copeland's conclusions quoted above we wish to direct particular attention to a point which no previous grouping of commodity prices has brought out. This is that, with a general though slight down swing in commodity prices as a whole since 1923—though for 1928 and 1929 there was a trifling recovery from 1927—farm products and their manufactures, which are logically grouped together, have had a slightly rising tendency, as contrasted with the two other groups, mineral and forest products and their manufactures and also raw imports and their manufactures. The two latter have had a substantial decline.

And why should not commodity prices decline, when everyone is working to produce more economically and efficiently? That is the natural thing, and when it does not occur, or when it does not appear in the bare figures, it is because something offsets as to the figures, though not as to the concrete result. The concrete result, of course, is how much in material things or services we can get for the work we do. Prices may rise and wages and salaries rise still more, whereby we are better off.

Here, however, we have it, in essence, that mining and manufacturing and related industries are giving the public more than they did seven years ago, while in farm products and their manufactures the public gets less. Farms, on the whole, are conducted much more efficiently than they were a generation ago; but they have made nothing like the seven-league strides which most of our industries have covered. There remains the basic question: Why cannot agricultural commodities be produced more economically than they are now, whereby the farmer will be at least as well off and his customer better off? Why cannot our progress in industry be matched by gains of similar magnitude on the farm?

National Income Exaggerated

IN the same issue of the *Annalist* recently were published the estimates of the national income by the National Bureau of Economic Research and by Dr. W. R. Ingalls. Estimating for 1928 the former gives 89.4 billion dollars and the latter 75.9 billion dollars. This wide difference in itself is not surprising. The subject is inherently so vague, so incapable of precise measurement, that neither of these authorities would pretend to a finding within 10 per cent. The specialist in this subject in the National Bureau of Economic Research is Dr. W. I. King, while Dr. Ingalls himself was formerly a member of the executive committee of that organization.

In 1923 the two authorities were substantially in harmony, the former giving 74.3 and the latter 72.3 for that year. In 1927 their respective totals were 88.2 and 72.8. There is therefore a challenge in respect to a period of four years, which happens to be the period following the depression of 1920-22. For this period there are also available estimates of the National Industrial Conference Board (not yet for 1928) which are much more closely in agreement with Dr. Ingalls than they are with Dr. King.

The question arises: Did our national prosperity increase so much following 1920-22 as has been the common belief or did it not? Up to the culmination of the boom in the stock market last summer the popular answer would doubtless have been in the affirmative, but since the collapse of last October-November the negative has, at least, received more attention.

In support of the affirmative there have been the familiar representations of great increases in corporate earnings and dividends, increases in efficiency, in consumptive requirements, etc. This was the very fuel for the bull market, and promoters, financiers and even bankers piled it on, inasmuch as it suited their purposes.

The statistical findings to such an effect were probably correct. We did not pause to consider, however, that the increased earnings of corporations might be at the expense of other forms of business. It is well-

known, for example, that the affairs of the great mail order houses waxed while those of local merchants waned. It is well-known also that in some branches of manufacturing there have been strong reductions in labor requirement through improved mechanization, but what part has this played in the total of manufacturing, which accounts for about one-third of our national income, and has the labor that has been released become engaged in other production? Or have there been fewer work-hours for the laboring population as a whole?

In the last connection we may remind ourselves that fewer work-hours is the present great aspiration of organized labor, which annually boasts of its progress in that direction. Obviously, curtailment of work-hours does not harmonize with increase in production, i.e., with national income. This leads to the thing that perplexes, that a great upward sweep in the national income ought to be reflected in a corresponding increase in the aggregate production of raw materials, whereas the statistics do not show it.

In a way these thoughts are comforting. Up to last summer we believed we were ascending a mountain, with beautiful views and enjoyment in every way, only to stumble over a precipice and fall. Perhaps we have awakened to realize that this was only a dream and that really we have been but plodding up the sandy road of economic life much as usual, and have been lucky to avoid any real pitfalls.

Stabilizing Automobile Output

ANY person in New York who had hesitated recently as between the purchase of an automobile or a radio could have had both within the past week at the price of one. A large automobile company announced a clearance sale of used cars and offered as an inducement a $235 radio set of standard make at no extra cost.

The giving of premiums with automobiles is new. It illustrates well the concern over moving the large stocks of used cars to ease the 1930 season for the purchase of new cars. On the same day that the advertisements of this unusual sale appeared, two leading automobile manufacturers issued interesting statements regarding the automobile outlook.

Walter P. Chrysler, chairman and president of the Chrysler Corporation, stated that automobile manufacturers are "cleaning house" and that "overloaded distribution facilities are being relieved of pressure of stocks on hand, and inventories will be greatly lowered by April 1." He added that both automobile manufacturers and dealers will handle the merchandising of automobiles this year on a more profitable basis and that the used car situation will be better handled.

Alfred P. Sloan, Jr., president, General Motors Corporation, predicted that the studies which his company have made "indicate a stabilization of the American industry at around 5,500,000 vehicles a year to be reached within the next few years."

Throughout the automobile industry there is an apparent determination to limit the production of cars to the index provided by retail sales. If this is adhered to and the industry solves the problem of dealers' stocks of used and unused cars, including trade-in allowances and the scrapping of obsolete cars, there will be a stability that will have a salutary effect on business in general.

CORRESPONDENCE

Education and Training for Industry

To the Editor: On page 1662 (Dec. 19) I read with interest the article "Encouraging Education and Training for Industry."

Being a machinist myself for 40 years, having learned my trade in Germany, I have seen the handwriting on the wall for the last 20 years. Practically all parents want their boys to have an education so they will have a clean job and not soil their hands or bring home dirty overalls. They do not as yet realize that there is an oversupply of white-collared boys, who cannot drive a nail.

What this United States needs is, first of all, parents who wish to help the young men to get a foundation for their future livelihood so they can make a decent living. As it is today, it is a shame to see young men grow up so that all they are good for is to drive a milkwagon, truck, or be used for common labor only.

However, wages for all-around mechanics should also be much better, not 75 or 85c. an hour, when a washerwoman gets 60c. an hour besides meals.

If wages are attractive for good mechanics, you will find that the young men will get interested, and you will soon have plenty of good men who know their jobs. This country surely needs them now and more and more in the future. The sooner we make it compulsory for young men to learn trades, as in school, the sooner our country will be on a better footing.

CHARLES F. L. KAUFMANN,
Partner, Southwest Mfg. Co.

Santa Ana, Cal.

Copper's Service to Industry

Copper's role in meeting the increased demand for machinery and for manufacturing materials, resulting from the application of power to industry, is described in a special issue of the bulletin of the Copper and Brass Research Association, 25 Broadway, New York, featuring "Copper's Service to Industry."

One of the leading clock and watch manufacturers alone consumes about 1,150,000 lb. of brass annually. A single rapid transit system in New York requires 650,000 lb. of copper, brass and bronze each year for service use, in addition to more than 2,000,000 ft. of copper wire and cable. Feminine vanity creates a market of 25,000 lb. of copper a year in the manufacture of rouge boxes and compacts by one firm.

Clothing manufacture calls for an extensive use of copper and the metal performs many services in the textile industry processes of dyeing, washing, bleaching, drying, printing, pressing and calendering. The estimated annual increase in electric horsepower used by textile mills indicates that the industry is responsible for a yearly consumption of about 6,300,000 lb. of copper for electrical purposes alone.

Austin Co. to Make Large Purchases for 1930

More than 45,000 tons of reinforcing and structural steel are included in a buying program of the Austin Co., Cleveland, for building materials for the entire year of 1930. This program represents an increase of 20 per cent over the company's purchases of supplies for 1929. These purchases do not include those which will be made in connection with the company's $40,000,000 automobile plant and industrial city project in Russia.

The company, according to announcement by W. J. Austin, president, is now negotiating many of these annual material contracts for the new year's requirements. All purchases are made by the headquarters office at Cleveland, for delivery to any part of the United States.

A few of the items and approximate quantities, for which the company announces it is in the market, follow:

Steel sash—more than 1,500,000 sq. ft.
Glass (rough, clear, plate, and figured)—more than 1,500,000 sq. ft.
Putty—1500 tons
Paint products—90,000 gallons
Wood block—700,000 sq. ft.
Steel roofing decks—750,000 sq. ft.
Wire mesh—500,000 sq. ft.
Rivets—1000 tons
Corrugated steel roofing and siding—3000 tons.
Reinforcing steel—20,000 tons
Structural steel—25,000 tons.

The company's requirements also include comparable quantities of heating equipment, plumbing supplies, hardware, partitions, electrical equipment, roof drains, concrete mixers, ventilators, foundry equipment, airport equipment, cranes, pumps, hoists, compressors, elevators, and ornamental iron and steel.

Newton Steel Co. Offers $3,000,000 in Gold Notes

The Newton Steel Co., Youngstown, is offering through Cleveland bankers an issue of $3,000,000, two-year, 6 per cent convertible gold notes. Proceeds of the issue will be used to supplement funds already raised by sale of common stock for the cost of the company's new plant at Monroe, Mich. Notes are convertible into common stock on the basis of $83.33 a share for the common stock.

James A. Campbell Looks for Fairly Good Year

James A. Campbell, chairman of the Youngstown Sheet & Tube Co. says:

"I am of the opinion 1930 will be found to have been an average business year 12 months from now. The year will start somewhat slowly in some lines, but other lines will be better, helping to maintain the average. Most of the railroads, public utilities and large industrial concerns intend to spend large sums of money on improvements and betterments of their properties. A large public construction program has been announced, which will require large amounts of various materials.

"The automobile business may be slow getting under headway, but the public has always bought cars and always will; this year will be no exception. People in this age will have automobiles even if they have to go without something else."

The Week in Business

Drift of Current Financial and Economic Opinion

ALL are agreed that Wall Street liquidation was a necessary major operation. The National City Bank of New York well states in its January review that the release of several billions from the stock market, and "the resulting decline of interest rates for all purposes, will be beneficial to general business, and that the effects will be cumulative as they spread."

But commentators are singularly noncommittal on the length of time it will take for this salutary influence to make itself felt. The Bache *Review* speaks of the "present impenetrable veil over the future of business." Theodore H. Price, *Commerce and Finance*, refers to "thousands of unthought-of possibilities" that may change the future. The National City Bank calls attention to the "incalculable influences beyond control" that normally cause fluctuations in the volume of production and trade.

Forces More Important Than Figures

It is not that the cyclists have taken a fall or that statistics don't stick, but rather that they don't fully satisfy. Figures and graphs, in the view of the business bulletin of the La Salle Extension University, are less helpful as a guide to the future than an understanding of the "new forces which the departing year has developed and left as legacies to the new."

One of these is management's more enlightened attitude on employment. President Hoover's conferences gave fresh emphasis to the fact that the employee is a consumer and that business suffers when he is thrown out of work.

Another legacy is a reacceptance of the old laws of investment, following the collapse of the "new era" doctrine.

Americanizing the World

A third force mentioned by the La Salle bulletin is the "Americanization of the world." "All the thinking world has been studying America for the secret of our greatness," it declares. "And this is something we must be anxious to help them find, for our growth from this point on depends more and more on the growth of the world, while our truest security lies in removing all cause for envy by helping our neighbors to become as prosperous and contented as we."

A Dynamic Business Decade

Dr. Julius Klein, writing in the New York *Herald Tribune*, also seeks light on the future by studying recent economic changes. He calls the last ten years the "dynamic decade of business history."

The period was marked by "swift alteration of direction and purpose of economic effort" and quick adaptations of America's elastic industrial fabric to those changes. Rapid progress in technique, unprecedented application of research to problems of industry and trade, increasing insistence on prompt and more accurate business statistics and a world-wide growth of group effort are other significant characteristics of the period.

The value of collaborative attack on all kinds of trade and industrial problems, Dr. Klein points out, has been demonstrated here by integration through mergers and trade associations and abroad by cartelization.

Our Opportunities Abroad

Perhaps nothing points more definitely to the Americanization of the world than our swelling exports of manufactured products. Shipments of machinery to other countries in 1929 were second to our exports of cotton. Totaling $600,000,000, they were 20 per cent larger than in 1928. This trend should be accentuated by a revival of foreign loans, which declined sharply last year because of Wall Street speculation.

Steel Merger Movement to Go Further

Continental Shares, Inc., Intimates Other Large Independents Will Join Republic Steel

IN a statement issued for publication, Continental Shares, Inc., the Cleveland holding company which was instrumental in bringing about the formation of the new Republic Steel Corporation, says:

"The full significance of the part Continental Shares, Inc., was playing in the steel industry was not generally known until its listing for trading on the New York Stock Exchange a few days before the steel merger was announced. It was then revealed, together with closely affiliated interests, as the largest holder of independent steel company stocks in this country.

"Continental Shares not only has extensive interests in the companies already welded together in the newest merger, but both directly and indirectly in other independents as well. The most important of these are the Youngstown Sheet & Tube Co., the Inland Steel Co. and the Wheeling Steel Corporation. Opinion is current in the steel trade that the Republic Steel Corporation is merely the first step toward a much larger consolidation, which will include other big independents.

"Acquisition of independent steel company stocks with a view to possible mergers was begun by Continental Shares shortly after its formation over three years ago. Since that time the range of its holdings and its influence has spread widely and rapidly. Preliminary to the latest merger, a number of smaller consolidations had already been effected.

"These moves are directly in line with the policy of Continental Shares, Inc., as outlined by W. R. Burwell, president of the company, in the company's listing statement recently submitted to the New York Stock Exchange:

> While the corporation places some of its funds in stocks purely for investment, its chief purpose is to acquire substantial holdings, either alone or in conjunction with affiliated interests, in prominent companies in such basic industries as steel, rubber, and public utilities.
>
> These larger investments are held with the view of promoting more effective cooperation and more efficient management by means of cooperation among, or mergers of reorganization of, the companies concerned. Having such an end in view, Continental Shares looks to the carrying out of its plans for ultimate profits rather than to current market quotations.

"It is not a part of the policy of Continental Shares to dictate to managements of the various industries in which it is interested. However, according to its officials, it does regard itself as a partner in these companies and offers its cooperation in any direction where it can make a contribution. This applies to matters of finance, merger negotiations and similar activities and not to the conduct of the company's business.

"By means of the steel consolidations, the Continental Shares-Eaton group hopes to enhance the stability and soundness of the steel industry. This greater stabilization will result from establishing a uniform policy over a larger part of the steel industry in the Middle West, and it should benefit consumer and producer alike."

To Give $10,000 Annually for Scientific Achievement

For scientific accomplishment the *Popular Science Monthly* will confer an annual prize of $10,000, accompanied by a gold medal, upon the American citizen who has been responsible, during the preceding year, for the achievement in science of greatest potential value to the world.

The award is intended in part to heighten the interest of the American people in those conquests of the laboratory and the workshop which benefit the entire community. The committee of award includes the following, all of whom are members of the American Society of Mechanical Engineers: Prof. Collins P. Bliss, director, Popular Science Institute; Dr. Harvey N. Davis, president, Stevens Institute of Technology; Charles F. Kettering, president, General Motors Research Corporation; Dr. Arthur D. Little, president, Arthur D. Little, Inc.; Dr. Elmer A. Sperry, chairman, board of directors, Sperry Gyroscope Co.; Dr. Samuel W. Stratton, president, Massachusetts Institute of Technology; Henry Herman Westinghouse, chairman, board of directors, Westinghouse Airbrake Co.; Dr. Albert E. White, director, department of engineering research, University of Michigan; and Orville Wright, coinventor of the airplane.

The War on Red Ink

A great war on red ink will mark 1930, according to Frederick M. Feiker, managing director, Associated Business Papers, New York, who addressed a conference at the Boston Chamber of Commerce, Jan. 4, as chairman of the advisory committee of the United States Department of Commerce on the census of distribution. He looks to this special census to dramatize the need of analytical study of merchandising and selling. From this will come a knowledge, which is "the ammunition for the war on red ink."

"The small manufacturer," said he, "is applying the methods of the big manufacturer in reducing his costs. Through the medium of committee activities of organized trades and the editorial and advertising pages of technical and industrial journals, the best practice of the individual is rapidly becoming the common practice of all. Unit costs are being reduced by scientific analysis of methods. A single dramatic example of the extent of this opportunity in manufacturing, even after twenty-five years of industrial discussion, is the recent employment of an engineer-analyst, Ray M. Hudson, by the industries of Massachusetts, who, working through the New England Council, is proposing to serve industry by object-lesson analyses of manufacturing equipment and methods."

A point made by Mr. Feiker is that the new methods of analyzing sales costs which the census of distribution will stimulate will probably have as much value as the facts themselves. "Just as the census will provide a body of fact with which the merchant himself can compare his own business with others locally and nationally, so the totals of sales by commodities and by territories and by classes of merchants will be of fundamental importance to the manufacturer and distributor of those commodities. Sales and advertising costs are being analyzed, more and more, on the basis of quotas of attainment. Quotas of sales involve more than the records of the individual manufacturer and of his customers, which he can get from his own books."

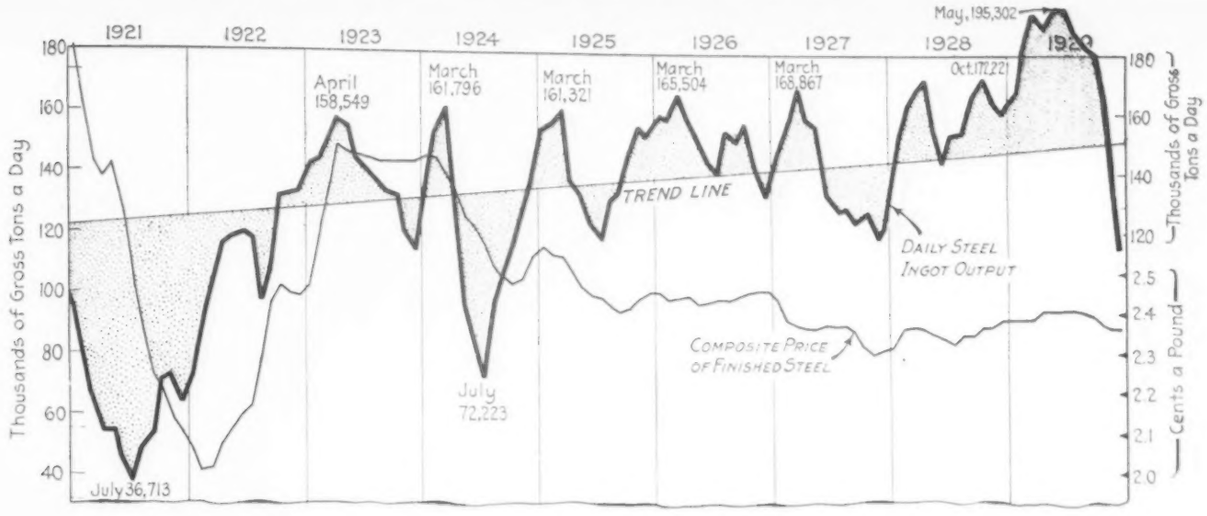
Mr. Feiker urges that we stop thinking in terms of volume as the coverall to hide our business mistakes and think in terms of which lines are profitable and which are not. "Every time an expert, who, as someone facetiously has said, is a man from out of town, analyzes the sales program of a manufacturer or merchant, he finds two things: High cost sales items that are unprofitable mixed in total figures with low cost and highly profitable items. Volume of sales confused with profits."

Wire Rope Discussions Published

Proceedings of the third conference on wire rope research, held in New York, Sept. 13, under the joint auspices of the American Society of Mechanical Engineers and the Engineering Foundation, are ready for distribution. They include papers describing the use and abuse of wire rope in various fields, such as elevators, cableways, excavating machinery, logging and generating plants. An abstract of a paper by Dr. R. Woernle describing the work of the German committee on wire rope and the tentative test specifications for wire rope sponsored by the Deutscher Verband für die Materialprufung der Technik are also given. Copies of these proceedings may be obtained from the A. S. M. E., 29 West Thirty-ninth Street, New York.

Organization of a special sub-committee of the A. S. M. E. research committee to conduct an exhaustive investigation of wire rope problems is being considered.

Ingot Output in December Made the Lowest Daily Average in Five Years. As a result the curve is far below normal for the first time in many months. Finished steel prices are about on parity with those a year ago



Further Drop in Steel Ingot Output

Total for Year 8½ Per Cent Above 1928 and a New High Record— December Showed Lowest Daily Average Since October, 1924

PRODUCTION of steel ingots in December was more than 600,000 tons below the low November figure, and was 1,120,000 tons below the total for December, 1928, according to figures of the American Iron and Steel Institute. The calculated December total was 2,896,269 tons, compared with 3,513,025 tons in November and 4,511,650 tons in October.

On the daily basis December, with 25 working days, dropped to 115,851 tons from November's 135,116 tons and October's 167,098 tons a day. Not only was the December daily average the lowest of the year; it was the lowest since October, 1924, when 115,756 tons was registered.

Both open-hearth and Bessemer steel participated in the continuing decline, but not equally. Reports from open-hearth plants showed a December drop of 15 per cent, from the 2,797,488 tons of November to 2,376,775 tons in December. Similar returns from Bessemer plants showed a drop of 31 per cent, from the 522,672 tons in November to 360,489 tons in December.

Year's Record Heavily Broken

Despite the heavy shrinkage during the two months, which produced 2,600,000 tons less than in September and October, the total for the year has gone to a figure far higher than was ever before reached. At 54,164,348 tons, a gain was registered of 8.6 per cent above the total for last year, which was by a large margin a high record. The gain has been close to 4,300,000 tons. The number of working days in the two years was the same, at 311.

Electric and crucible ingots are not included in these totals. Production of these two types of steel in 1928 at 460,208 tons averaged about 1480 tons a day. Some such amount would have to be added to the total and the daily figures in the table to obtain the total ingot output of the United States.

In the diagram are traced the course of ingot production and finished steel prices for nine years. The table covers 1928 and 1929.

PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS
(Gross Tons)

1928 Months	Reported by Companies Which Made 94.51 Per Cent of the Steel Ingots in 1928		Calculated Output of All Companies		No. of Working Days
	Open-Hearth	Bessemer	Monthly	Daily	
January	3,273,294	498,691	3,990,902	153,496	26
February	3,300,407	521,250	4,043,457	161,738	25
March	3,692,648	567,330	4,507,217	166,934	27
April	3,505,104	564,110	4,305,382	172,215	25
May	3,394,301	582,128	4,207,212	155,823	27
June	3,010,341	528,193	3,743,903	143,996	26
July	3,068,257	528,588	3,805,598	152,224	25
August	3,379,625	569,771	4,178,610	154,763	27
September	3,375,654	544,710	4,147,893	165,916	25
October	3,795,800	599,098	4,643,968	172,221	27
November	3,442,112	590,669	4,266,835	164,109	26
December	3,301,114	496,679	4,018,208	160,728	25
Total	40,538,657	6,591,217	49,865,185	160,338	311
1929					
January	3,694,218	549,616	4,490,354	166,309	27
February	3,599,224	489,279	4,326,000	180,250	24
March	4,183,869	596,691	5,058,258	194,548	26
April	4,026,576	640,351	4,928,025	189,924	26
May	4,276,186	707,484	5,273,167	195,302	27
June	3,990,798	622,585	4,881,370	195,255	25
July	3,922,532	649,950	4,838,093	186,080	26
August	3,988,729	668,023	4,927,258	182,491	27
September	3,627,639	635,593	4,510,879	180,435	25
October	3,619,432	644,528	4,511,650	167,098	27
November	2,797,488	522,672	3,513,025	135,116	26
December	2,376,775	360,489	2,896,269	115,851	25
Total	44,103,466	7,087,261	54,164,348	174,162	311

The Surface Combustion Co., Toledo, Ohio, has received a contract for four continuous sheet pack furnaces and four continuous pair furnaces of the recently developed walking beam type. They will be installed in the Sparrows Point, Md., plant of the Bethlehem Steel Co.

Large Loss in December Iron Output

Daily Rate Less Than November by 14,534 Tons or 13.7 Per Cent—No Furnaces In, 20 Shut Down—Year's Total 5.5 Per Cent Above Record

CONTRACTION in pig iron operations, which set in during November, was even more drastic in December. The daily rate, which declined 8.3 per cent in November, fell 13.7 per cent during December. For the first time in many months, if not for any month, no furnaces were blown in and 20 were shut down last month. This followed a net loss of 26 furnaces in November. The net loss of 46 furnaces in the last two months contrasts with a net loss of 86 furnaces in April and May of 1924. The net loss in the last two months of 1929 was equalled by the loss in May, 1924, of 46.

Production of coke pig iron in December was 2,836,916 gross tons or 91,513 tons per day for the 31 days. This contrasts with 3,181,411 tons for November or 106,047 tons per day for 30 days. The net loss for December was 14,534 tons in the daily rate or 13.7 per cent. The December daily rate is not only the smallest for 1929 but is the smallest since December, 1927, when it was 86,960 tons. A year ago, or in December, 1928, the daily rate was 108,705 tons.

Operating Rate on Jan. 1

Decline in operating rate at the beginning of the month was not so large as on Dec. 1. The 157 furnaces blowing on Jan. 1 had an estimated oper-

Daily Average Production of Coke Pig Iron in the United States by Months Since Jan. 1, 1925—Gross Tons

	1925	1926	1927	1928	1929
Jan.	108,720	106,974	100,123	92,573	111,044
Feb.	114,791	104,408	105,024	100,004	114,507
Mar.	114,975	111,032	112,366	103,215	119,822
Apr.	108,632	115,004	114,074	106,183	122,087
May	94,542	112,304	109,385	105,931	125,745
June	89,115	107,844	102,988	102,733	123,908
½ year	105,039	109,660	107,351	101,763	119,564
July	85,936	103,978	95,199	99,091	122,100
Aug.	87,241	103,241	95,073	101,180	121,151
Sept.	90,873	104,543	92,498	102,077	116,585
Oct.	97,528	107,553	89,810	108,832	115,745
Nov.	100,767	107,890	88,279	110,084	106,047
Dec.	104,853	99,712	86,960	108,705	91,513
Year	99,735	107,043	99,266	103,382	115,851

Pig Iron Production by Districts, Gross Tons

	Dec. (30 days)	Nov. (30 days)	Oct. (31 days)	Sept. (30 days)
New York and Mass.	176,191	229,850	243,702	235,317
Lehigh Valley	77,314	73,856	84,676	82,623
Schuylkill Valley	68,512	73,321	75,303	69,373
Lower Susq. and Lebanon Valleys	37,428	35,332	37,405	37,900
Pittsburgh district	609,148	646,461	772,236	770,222
Shenango Valley	48,425	63,297	93,928	131,052
Western Pennsylvania	103,671	121,833	154,451	144,394
Maryland, Va. and Ky.	98,296	120,346	120,428	114,181
Wheeling district	131,594	165,272	130,217	125,009
Mahoning Valley	220,143	293,706	371,718	354,446
Central and North'n Ohio	254,161	338,978	370,967	359,420
Southern Ohio	44,702	49,462	48,835	46,973
Illinois and Indiana	589,465	644,039	706,489	703,228
Mich., Minn., Mo., Wis., Colo. and Utah	141,869	148,281	148,837	131,329
Alabama	229,857	228,021	219,015	182,427
Tennessee	6,140	9,356	9,911	9,670
Total	2,836,916	3,181,411	3,588,118	3,497,564

Daily Rate of Pig Iron Production by Months—Gross Tons

	Steel Works Iron	Merchant Iron*	Total
December, 1928	85,415	23,290	108,705
January, 1929	85,530	25,514	111,044
February	89,246	25,261	114,507
March	95,461	24,361	119,822
April	95,680	26,407	122,087
May	100,174	25,571	125,745
June	99,993	23,915	123,908
July	98,044	24,056	122,100
August	98,900	22,251	121,151
September	95,426	21,159	116,585
October	93,644	22,101	115,745
November	83,276	22,771	106,047
December	68,152	23,361	91,513

*Includes pig iron made for the market by steel companies.

Coke Furnaces in Blast

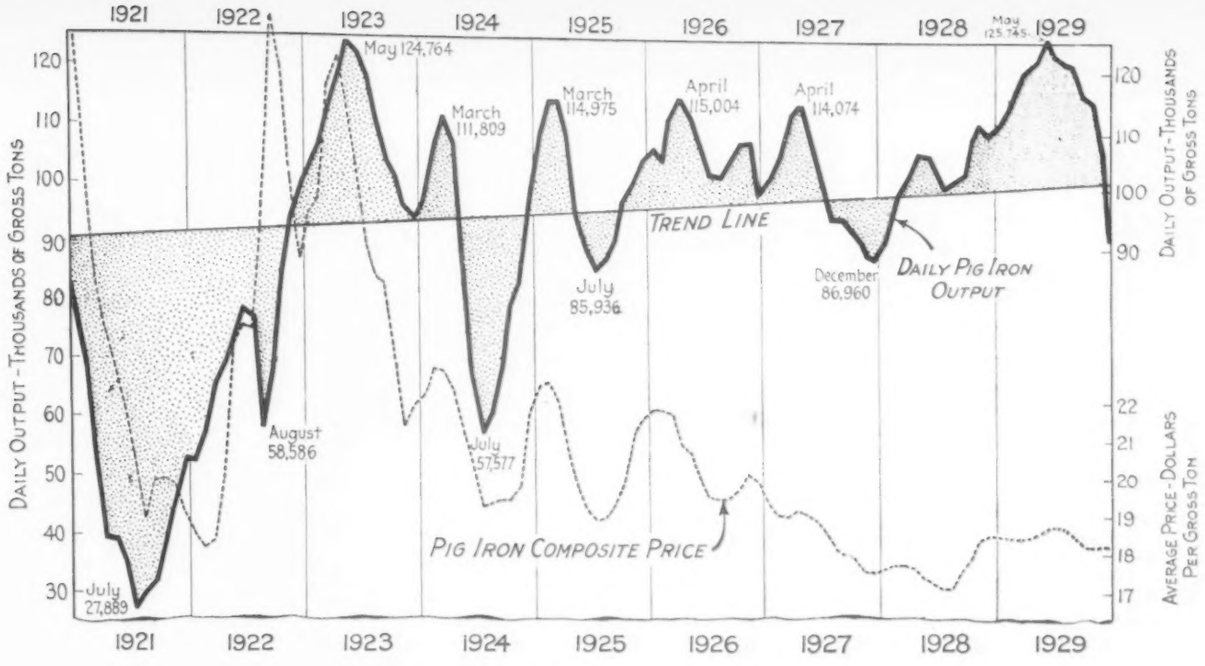
Furnaces	Jan. 1 Number in Blast	Jan. 1 Gross Tons per Day	Dec. 1 Number in Blast	Dec. 1 Gross Tons per Day
New York:				
Buffalo	9	4,515	11	5,540
Other N. Y. and Mass.	3	1,065	3	1,140
New Jersey	0	....	0	....
Pennsylvania:				
Lehigh Valley	5	2,470*	5	2,270*
Schuylkill Valley	4	2,055	5	2,440
Susquehanna Valley	2	1,205	2	1,175
Pittsburgh District	30	19,000	36	19,300
Ferro. and Spiegel	3	625	3	550
Shenango Valley	2	1,190	3	1,705
Western Pennsylvania	6	2,955	7	3,250
Ferromanganese	2	405	2	415
Maryland	4	2,665	5	3,045
Wheeling District	6	3,620	7	4,220
Ohio:				
Mahoning Valley	10	6,390	13	8,250
Central and Northern	15	9,700	17	10,700
Southern	4	1,440	4	1,650
Illinois and Indiana	26	17,670	29	19,500
Mich., Wis. and Minn.	5	2,400	6	2,865
Colo., Mo. and Utah	3	1,475	4	1,950
Ferromanganese	1	70	1	70
The South:				
Virginia	1	220	1	165
Ferromanganese	1	95	1	90
Kentucky	0	....	1	350
Alabama	14	6,820	16	7,600
Tennessee	1	200	1	210
Total	157	88,250	177	98,450

*Includes spiegeleisen.

Production of Coke Pig Iron in United States by Months Beginning Jan. 1, 1927—Gross Tons

	1927	1928	1929
Jan.	3,103,820	2,869,761	3,442,370
Feb.	2,940,679	2,900,126	3,206,185
Mar.	3,483,362	3,199,674	3,714,473
Apr.	3,422,226	3,185,504	3,662,625
May	3,390,940	3,283,856	3,898,082
June	3,089,651	3,082,000	3,717,225
½ year	19,430,678	18,520,921	21,640,960
July	2,951,160	3,071,824	3,785,120
Aug.	2,947,276	3,136,570	3,755,680
Sept.	2,774,949	3,062,314	3,497,564
Oct.	2,784,112	3,373,806	3,588,118
Nov.	2,648,376	3,302,523	3,181,411
Dec.	2,695,755	3,369,846	2,836,916
Year*	36,232,306	37,837,804	42,285,769

*These totals do not include charcoal pig iron. The 1928 production of this iron was 142,960 gross tons.



Daily Production at Lowest Rate Since December, 1927

Inclined line represents the gradually increasing theoretical needs of the country, ascertained by a balancing of the ups and downs in production. It shows an average yearly increase in consumption of about 432,000 tons

ating rate of 88,250 tons compared with 98,450 tons as the estimated rate of the 177 furnaces active on Dec. 1. The decline on Jan. 1 was 10,200 tons per day in operating rate as against 15,150 tons per day on Dec. 1.

There were 20 furnaces blown out or banked during December with none blown in. Of these, independent steel companies accounted for 11, the Steel Corporation for three and merchant producers for six. There were thus 14 steel-making stacks shut down.

The Year's Total a Record

With coke pig iron production at 42,285,769 tons for 1929, a new year's total was recorded. This is 5.5 per cent larger than the former high record of 40,059,308 tons in 1923 and exceeds the 1928 total by 11.7 per cent.

Large Loss in Steel-Making Iron

There was a large loss in steel-making iron in December—15,124 tons per day or 18.5 per cent from November. The November loss from October was 10,368 tons per day or 11 per cent. Merchant iron made a small gain.

At 28,564 tons the December ferromanganese output was the fourth largest last year. The November output was 28,285 tons and the high for the year was 33,363 tons in June.

Twenty Furnaces Shut Down

It has been many years since a month has passed without any furnaces being blown in. This was true of December.

Operations were confined to the blowing out or banking of 20 furnaces last month, as follows: One Lackawanna furnace of the Bethlehem Steel Corporation and one furnace of the Donner Steel Co. in the Buffalo district; the Delaware River furnace in the Schuylkill Valley; one furnace at the Cambria plant of the Bethlehem Steel Corporation in western Pennsylvania; one furnace of the Maryland plant of the Bethlehem Steel Corporation in Maryland; the Ashland furnace of the American Rolling Mill Co. in Kentucky; No. 4 Haselton furnace of the Republic Iron & Steel Co., one Hubbard furnace of the Youngstown Sheet & Tube Co. and the Cherry Valley furnace in the Mahoning Valley; one Shenango furnace in the Shenango Valley; No. 1 furnace of the Weirton Steel Co. in the Wheeling district; No. 1 furnace of the National Tube Co. in northern Ohio and one furnace of the Central Alloy Steel Corporation in central Ohio; one Joliet and one Gary furnace of the Illinois Steel Co. in the Chicago district and the A furnace of the St. Louis Gas & Coke Co. in Illinois; one Detroit furnace in Michigan and one furnace of the Colorado Fuel & Iron Co. in Colorado, and two furnaces of the Woodward Iron Co. in Alabama.

Production of Steel Companies for Own Use—Gross Tons

	Total Pig Iron Spiegel and Ferromanganese			Ferromanganese*		
	1927	1928	1929	1927	1928	1929
Jan.	2,343,881	2,155,133	2,651,416	31,844	22,298	28,208
Feb.	2,256,651	2,274,880	2,498,901	24,560	19,320	25,978
Mar.	2,675,417	2,588,158	2,959,295	27,834	27,912	24,978
Apr.	2,637,919	2,555,500	2,826,028	24,735	18,405	22,413
May	2,619,078	2,652,872	3,105,404	28,734	29,940	25,896
June	2,343,409	2,448,905	2,999,798	29,232	32,088	33,363
½ year	14,876,355	14,675,448	17,040,842	166,939	149,963	160,836
July	2,163,101	2,464,896	3,039,370	26,394	32,909	31,040
Aug.	2,213,815	2,561,904	3,065,874	21,279	24,583	28,461
Sept.	2,090,200	2,477,695	2,862,799	20,675	22,278	27,505
Oct.	2,076,722	2,729,589	2,902,960	17,710	23,939	31,108
Nov.	1,938,043	2,654,211	2,498,291	17,851	29,773	28,285
Dec.	1,987,652	2,647,863	2,112,704	20,992	28,618	28,564
Year	27,345,888	30,211,606	33,522,840	291,840	312,063	335,799

*Includes output of merchant furnaces.

Tonnage rates for sheet and tin mill workers in Midwestern plants continue unchanged in January and February, from the November-December rates.

Iron and Steel Markets

Steel Production Gains

Present Rate Is 60 Per Cent and a 65 Per Cent Month Seems Assured—Price Declines in Tin Plate, Body Sheets and Strip

STEEL production has taken an upturn after two months of sharp curtailment and the outlook is for further improvement, although it is expected to be gradual.

Finished steel prices have developed numerous irregularities, as well as a few general reductions, but the Pittsburgh scrap market shows added strength, with heavy melting grade up $1 a ton to $16.75, which is $1.50 a ton above the low point reached Dec. 3.

The betterment in steel demand is due mainly to an increase in the number of specifications rather than in their size. Buyers are still very cautious, and it is too early to determine how much of the tonnage they are now releasing represents replenishment of stocks and how much reflects larger current needs.

Pig iron production in December showed an even sharper decline than had been anticipated. Twenty blast furnaces were put out and none went in, making a net loss of 46 active stacks in the last two months of 1929, comparing with 86 in April and May, 1924, the largest net loss for a similar period in recent years.

Total output for December was 2,836,916 tons, and the daily rate, at 91,513 tons, was the lowest since the final month of 1927. On Jan. 1, with 157 furnaces in blast, the production rate was 88,250 tons daily, against 126,150 tons on June 1, 1929, the high point last year, and 110,675 tons twelve months ago.

December steel ingot output, at 2,896,269 tons or 115,851 tons daily, was at the lowest rate since October, 1924. Nineteen twenty-nine production of open-hearth and Bessemer ingots was 54,164,384 tons. Adding 500,000 tons for electric and crucible ingots, statistics for which are not yet available, the aggregate is close to THE IRON AGE'S recent estimate of 54,600,000 tons for the year. Total pig iron production for 1929, at 42,285,769 tons, fell slightly short of our estimate, exceeding the previous record of 1923 by 5.5 per cent.

Steel ingot output in December was at the rate of 59 per cent of capacity. January production, according to present indications, may approach 65 per cent. The current average is close to 60 per cent. The two largest producers have reached a 65 per cent rate, and operations in the leading steel centers are estimated at 65 per cent for Pittsburgh, 60 to 65 per cent for Chicago and 50 to 55 per cent at Youngstown.

Price unsettlement comes two months after the low point in demand. December bookings, in most cases, showed a gain over those of November. The increase for one important mill was 20 per cent and for another close to 30 per cent. January specifications, thus far, are slightly ahead of the average for the previous month.

Irregularities outnumber open breaks in prices, suggesting that some of the concessions may prove of a temporary character.

Tin plate has been reduced 10c. a base box to $5.25, Pittsburgh, the first official change in this quotation, except at the usual yearly intervals, since 1921. The decrease was not prompted by any lack of confidence in current or prospective demand, but was intended to clarify a muddled competitive situation.

Reductions of $2 a ton on automobile body sheets, hot-rolled strip and cold-rolled strip follow weakness that originated at Detroit. The pressure on prices by motor car builders is increasing as their operations improve. Thus far, gains in output have been largely confined to the makers of low-priced cars, as other manufacturers will not decide on their production schedules until after the January shows. Although steel specifications from the automobile industry continue to increase in the aggregate, they are still made up of comparatively small tonnages for current needs.

Bars, plates, shapes, black sheets, galvanized sheets, wire nails and plain wire have all been shaded $1 to $2 a ton, but with mills taking a stronger stand on these products general reductions may be avoided.

Rail releases are heavier, with rail mill operations up to 85 per cent at Chicago. The Burlington, which a week ago placed 57,100 tons, has bought 10,650 tons additional for its subsidiaries. The Nickel Plate is in the market for 29,860 tons and the Baltimore & Ohio is expected to inquire for its 1930 needs.

Action on the inquiry for 11,500 freight cars and 130 locomotives for the Chesapeake & Ohio, Pere Marquette and Hocking Valley will be taken late this month. About 145,000 tons of steel is involved. The Burlington has bought 500 automobile cars and the Seaboard Air Line is inquiring for 1000 box cars.

Fabricated structural steel awards, at 7000 tons, are very light, and fresh inquiries call for 21,000 tons.

Foundry coke at Connellsville has declined 25c. to $3.50 a ton.

THE IRON AGE composite prices are unchanged, finished steel at 2.362c. a lb. and pig iron at $18.21 a ton.

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous. Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	Jan. 7, 1930	Dec. 30, 1929	Dec. 10, 1929	Jan. 8, 1929
No. 2 fdy., Philadelphia	$20.76	$20.76	$21.26	$21.26
No. 2, Valley furnace	18.50	18.50	18.50	17.50
No. 2 Southern, Cin'ti	17.69	17.69	17.69	20.19
No. 2, Birmingham	14.50	14.50	14.50	16.50
No. 2 foundry, Chicago*	20.00	20.00	20.00	20.00
Basic, del'd eastern Pa.	19.50	19.50	19.50	19.75
Basic, Valley furnace	18.50	18.50	18.50	17.50
Valley Bessemer, del'd P'gh	20.76	20.76	20.76	20.01
Malleable, Chicago*	20.00	20.00	20.00	20.00
Malleable, Valley	19.00	19.00	19.00	18.00
L. S. charcoal, Chicago	27.04	27.04	27.04	27.04
Ferromanganese, furnace	100.00	100.00	100.00	105.00
Rails, Billets, Etc., Per Gross Ton:				
Rails, heavy, at mill	$43.00	$43.00	$43.00	$43.00
Light rails at mill	36.00	36.00	36.00	36.00
Rerolling billets, Pittsburgh	34.00	34.00	35.00	33.00
Sheet bars, Pittsburgh	34.00	34.00	35.00	34.00
Slabs, Pittsburgh	34.00	34.00	35.00	33.00
Forging billets, Pittsburgh	39.00	39.00	40.00	38.00
Wire rods, Pittsburgh	40.00	40.00	40.00	42.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.85	1.85	1.85	1.90
Finished Steel, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.90	1.90	1.90	1.90
Bars, Chicago	2.00	2.00	2.00	2.00
Bars, Cleveland	1.90	1.90	1.90	1.90
Bars, New York	2.24	2.24	2.24	2.24
Tank plates, Pittsburgh	1.90	1.90	1.90	1.90
Tank plates, Chicago	2.00	2.00	2.00	2.00
Tank plates, New York	*2.12½*	2.17½	2.17½	2.17½
Structural shapes, Pittsburgh	1.90	1.90	1.90	1.90
Structural shapes, Chicago	2.00	2.00	2.00	2.00
Structural shapes, New York	2.09½	2.09½	2.09½	2.14½
Cold-finished bars, Pittsburgh	2.30	2.30	2.30	2.20
Hot-rolled strips, Pittsburgh	*1.80*	1.90	1.90	1.80
Cold-rolled strips, Pittsburgh	*2.65*	2.75	2.75	2.85

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

Finished Steel, *Per Lb. to Large Buyers:*	Jan. 7, 1930 Cents	Dec. 30, 1929 Cents	Dec. 10, 1929 Cents	Jan. 8, 1929 Cents
Sheets, black, No. 24, P'gh	2.75	2.75	2.75	2.85
Sheets, black, No. 24, Chicago dist. mill	**2.85**	2.75	2.85	2.95
Sheets, galv., No. 24, P'gh	3.40	3.40	3.40	3.60
Sheets, galv., No. 24, Chicago dist. mill	3.50	3.50	3.50	3.70
Sheets, blue, No. 13, P'gh	2.25	2.25	2.35	2.20
Sheets, blue, No. 13, Chicago dist. mill	2.45	2.45	2.45	2.30
Wire nails, Pittsburgh	2.40	2.40	2.40	2.65
Wire nails, Chicago dist. mill	2.45	2.45	2.45	2.70
Plain wire, Pittsburgh	2.40	2.40	2.40	2.50
Plain wire, Chicago dist. mill	2.45	2.45	2.45	2.55
Barbed wire, galv., P'gh	3.05	3.05	3.05	3.30
Barbed wire, galv., Chicago dist. mill	3.10	3.10	3.10	3.35
Tin plate, 100 lb. box, P'gh	*$5.25*	$5.35	$5.35	$5.35
Old Material, Per Gross Ton:				
Heavy melting steel, P'gh	**$16.75**	$15.75	$15.25	$19.00
Heavy melting steel, Phila.	14.50	14.50	14.50	16.00
Heavy melting steel, Ch'go	12.50	12.50	12.50	14.75
Carwheels, Chicago	13.75	13.75	13.50	14.00
Carwheels, Philadelphia	15.00	15.00	15.50	16.50
No. 1 cast, Pittsburgh	14.50	14.50	14.50	16.00
No. 1 cast, Philadelphia	15.00	15.00	15.00	16.25
No. 1 cast, Ch'go (net ton)	13.50	13.50	13.50	15.75
No. 1 RR. wrot., Phila.	15.00	15.00	15.50	15.50
No. 1 RR. wrot., Ch'go (net)	12.00	12.00	12.00	13.25
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$2.60	$2.60	$2.65	$2.75
Foundry coke, prompt	*3.50*	3.75	3.75	3.75
Metals, *Per Lb. to Large Buyers:*	Cents	Cents	Cents	Cents
Lake copper, New York	18.12½	18.12½	18.12½	16.87½
Electrolytic copper, refinery	17.75	17.75	17.75	16.50
Tin (Straits), New York	**39.62½**	39.30	39.62½	49.87½
Zinc, East St. Louis	*5.30*	5.45	6.00	6.35
Zinc, New York	*5.65*	5.80	6.35	6.70
Lead, St. Louis	6.10	6.10	6.10	6.50
Lead, New York	6.25	6.25	6.25	6.65
Antimony (Asiatic), N. Y.	**8.37½**	8.12½	8.62½	9.60

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

Pittsburgh

Moderate Increase in Steel Orders Reflected in Operations —Heavy Melting Scrap Advances $1 a Ton

PITTSBURGH, Jan. 7.—Tonnage releases have increased on practically all products since the first of the year, and the turn in business which has been predicted for the last two months seems to have arrived in a mild way. However, steel makers in this district are still proceeding with caution, as specifications are notable for their number rather than their size, and it is evident that steel users are still pursuing a restrained policy in their future commitments. Many of them placed steel tonnage as the new year began because they absolutely had to have it in order to maintain production at even a minimum rate, but the larger consuming industries have not yet been able to discern whether the country's consuming buying power justifies a return to moderately heavy production.

The automobile industry, on which interest in the Pittsburgh steel trade still centers, is an excellent illustration of this attitude. Although the leading maker of cars in the low-priced field is rapidly increasing its output, other automobile makers are expected to wait until the January shows have been held before deciding on their production schedules, and it will be February before they begin to release steel orders in any large volume. And, of course, there is the possibility that the public's reaction to the motor exhibitions will not be as favorable as now expected. Steel ingot production in this and nearby districts is still improving. Although the 65 per cent operating rate estimated for this district may have been too high last week, it is now entirely justified, as practically all of the independent companies in this territory have added one or more open-hearth furnaces since the first of the year and the operations of the Steel Corporation subsidiaries are being stepped up. One company has put on five open-hearths at one plant, and others have added two or three. Such figures must not be misconstrued, however, as in some plants steel-making operations had been suspended entirely during the last two weeks of the past year.

Sheet and tin plate schedules alone are being increased as rapidly as primary steel making. The sheet industry is operating this week at better than 60 per cent of capacity, while tin mills in the district average close to 70 per cent. Other products are holding their own, with slight increases in bar mill operations and with some strip mills running a little better than they have been.

Pig iron production, however, is not yet increasing as steel company stocks of iron are large. The Bethlehem Steel Co. has taken out a furnace at Johnstown, while a Valley merchant stack will go in next week. Another Valley merchant furnace will be blown in this week, but this offsets the blowing out of a Pittsburgh stack of the same company.

Steel prices continue very weak, although open reductions have occurred on no products except tin plate, which has been reduced 10c. a base box to $5.25, Pittsburgh. In this case, the decline was not occasioned by lack of business or poor prospects, but rather by unrestricted price competition among several leading makers. Pressure for lower prices is still strong, but the smaller users of steel gener-

ally have contracted for first quarter at the present quotations, and market weakness centers in the efforts of larger users to develop lower figures. This has been done in some cases, but mills are inclined to hold out for a time in anticipation of increased business before the end of the month.

Pig Iron.—Pig iron buying is still confined to limited tonnages, but shipments have been released to a fair extent since the first of the year. A few foundries are not yet taking iron, but the majority had reduced their stocks to a point at which a few carloads were absolutely necessary to maintain a minimum operation. Large sales are still uncommon, and few of the more important buyers in the district have placed first quarter contracts. The Walworth Co., Greensburg, Pa., has placed its first quarter requirements of foundry iron, and the National Radiator Corporation is inquiring for 1500 to 2000 tons of foundry iron for delivery over the first quarter at its New Castle, Pa., plant. Otherwise, open market inquiries are not numerous, although some companies are said to be quietly negotiating for their requirements over the next three months. On small sales, $18.50, Valley, for foundry and basic iron, and $19 for malleable and Bessemer, are being done, while the local furnace continues to quote prices 50c. a ton higher. On Jan. 9 the Davison Coke & Iron Co. will blow in its Cherry Valley furnace at Leetonia, Ohio, while the company's Neville Island stack at Pittsburgh will be blown out for relining. Other repairs and improvements will be made, and the furnace will not be blown in for about 60 days. The Shenango Furnace Co. expects to put in one of its furnaces at Sharpsville next week.

Prices per gross ton, f.o.b. Valley furnace:

Basic	$18.50
Bessemer	19.00
Gray forge	18.00
No. 2 foundry	18.50
No. 3 foundry	18.00
Malleable	19.00
Low phos., copper free	27.00

Freight rate to Pittsburgh or Cleveland district, $1.76.

Prices per gross toon, f.o.b. Pittsburgh district furnace:

Basic	$19.00
No. 2 foundry	19.00
No. 3 foundry	18.50
Malleable	19.50

Freight rates to points in Pittsburgh district range from 63c. to $1.13.

Semi-Finished Steel.—A few of the large buyers of semi-finished steel in this territory have contracted for their first quarter requirements, but a number of them have enough crude steel coming to them on old contracts to last out the month. Contract business, which does not ordinarily come under a price preference, is bringing the full quoted schedules of $34, Pittsburgh or Youngstown, for billets, slabs and sheet bars. This price is also being quoted on a small amount of spot tonnage which is coming into the market from time to time. Shipments so far this month show a considerable improvement over those of December, but it is yet too early to know whether this merely represents replenishment of stocks, which were reduced to a minimum for inventory taking, or an increase prompted by larger current needs. The smaller sheet mills which must buy their unfinished steel have not increased their operations as much as might have been expected, but most of them look for a gain in tonnage as the quarter progresses. Forging billets are established at $39, Pittsburgh, and spot business has been in fair volume. Contracting for wire rods has been largely completed, with the $40, Pittsburgh or Cleveland, price holding on most of the business. Shipments of wire rods for some mills are considerably heavier than they were two weeks ago, as manufacturers of chain, wire rope and kindred products are placing larger releases. Bolt and nut makers are not yet increasing their orders to any marked extent.

Bars, Shapes and Plates.—Specifications so far this month have shown an encouraging increase, but the improvement is mostly in the number of orders placed rather than in their size. A part of this tonnage is undoubtedly needed to build up depleted inventories, as not many buyers are yet increasing their operations. Structural mills are comparatively well supplied with business, and tonnage releases for large projects are steady and in good volume. Expected increases in building construction during the year promise better business for steel fabricators in general, and the smaller companies in this district which were not very busy in the last quarter are considerably more hopeful. Barge builders are not busy just now, but some inquiry is coming out and there is little doubt that considerable steel will be required by this industry before the end of the quarter. The Chicago Bridge & Iron Works was low bidder on 20 barges which are being bought by the United States Engineer, Rock Island, Ill., and which will take about 1300 tons of steel. Awards on the 11,500 freight cars to be bought by the Van Sweringen railroads will probably be made late in January, and will almost certainly benefit Pittsburgh steel makers. The larger car builders in this territory have considerable business on their books, and are beginning to release steel tonnage in fair volume. Demand for bars is not yet very strong, but mills are running at a slightly better rate this week, and the addition of heavier automobile tonnage would again bring satisfactory volume. Prices on bars, shapes and plates are still weak, and the 1.90c., Pittsburgh, quotation now applies to a smaller tonnage than it did a fortnight ago. In the East, particularly, the delivered prices on plates and shapes figure back to considerably less than the quoted Pittsburgh figure.

Rails and Track Accessories.—The first week of January brought a good volume of specifications for immediate shipment, and mills generally were able to comply with the requests of their customers. With rail shipments steadily increasing, demand for track fastenings is naturally improved. No new inquiries of importance have come out in the last two weeks, but the Baltimore & Ohio is said to be about to inquire for its 1930 rail requirements. Light rails are very quiet, with prices determined largely by the extent of competition from the rerolled product.

Bolts, Nuts and Rivets.—This business has reacted to the general state of industrial activity, and operations average less than 50 per cent of capacity. Railroad car builders are taking a fair tonnage, but automobile requirements are curtailed, and the jobbing trade is ordering only for its immediate needs. Prices are strong in most territories, although the usual concessions are being made to the automobile industry. Bolts and nuts are quoted at 70 per cent off list, and small rivets at 70 and 10, while rivets ½ in. and larger are quoted at $3.10 a 100 lb., Pittsburgh or Cleveland.

The Iron Age Composite Prices

Finished Steel

Jan. 7, 1930, 2.362c. a Lb.

One week ago	2.362c.
One month ago	2.362c.
One year ago	2.391c.
10-year pre-war average	1.689c.

Based on steel bars, beams, tank plates, wire, rails, black pipe and black sheets. These products make 87 per cent of the United States output of finished steel.

	High	Low
1929	2.412c., April 2;	2.362c., Oct. 29
1928	2.391c., Dec. 11;	2.314c., Jan. 3
1927	2.453c., Jan. 4;	2.293c., Oct. 25
1926	2.453c., Jan. 5;	2.403c., May 18
1925	2.560c., Jan. 6;	2.396c., Aug. 18

Pig Iron

Jan. 7, 1930, $18.21 a Gross Ton

One week ago	$18.21
One month ago	18.29
One year ago	18.46
10-year pre-war average	15.72

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High	Low
1929	$18.71, May 14;	$18.21, Dec. 17
1928	18.59, Nov. 27;	17.04, July 24
1927	19.71, Jan. 4;	17.54, Nov. 1
1926	21.54, Jan. 5;	19.46, July 13
1925	22.50, Jan. 13;	18.96, July 7

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.90c.
F.o.b. Chicago	2.00c.
Del'd Philadelphia	2.22c.
Del'd New York	2.24c.
Del'd Cleveland	1.85c. to 1.90c.
F.o.b. Cleveland	1.85c. to 1.90c.
F.o.b. Lackawanna	2.00c.
F.o.b. Birmingham	2.05c. to 2.10c.
C.i.f. Pacific ports	2.35c.
F.o.b. San Francisco mills	2.35c.

Billet Steel Reinforcing

F.o.b. Pittsburgh mills, 40, 50, 60-ft.	2.00c.
F.o.b. Pittsburgh mills, cut lengths	2.25c.
F.o.b. Birmingham, mill lengths	2.05c. to 2.10c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.90c.
F.o.b. Chicago Heights mill	1.90c.
Del'd Philadelphia	2.27c.

Iron

Common iron, f.o.b. Chicago	2.00c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.12c.
Common iron, del'd New York	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.90c.
F.o.b. Chicago	2.00c.
F.o.b. Birmingham	2.05c.
Del'd Cleveland	2.09c.
Del'd Philadelphia	2.05c. to 2.10c.
F.o.b. Coatesville	1.95c. to 2.00c.
F.o.b. Sparrows Point	2.00c.
F.o.b. Lackawanna	2.00c.
Del'd New York	2.12½c. to 2.17½c.
C.i.f. Pacific ports	2.25c. to 2.35c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.90c.
F.o.b. Chicago	2.00c.
F.o.b. Birmingham	2.05c.
F.o.b. Lackawanna	2.00c.
F.o.b. Bethlehem	2.00c.
Del'd Cleveland	2.09c.
Del'd Philadelphia	1.96c. to 2.06c.
Del'd New York	2.09¼c. to 2.14½c.
C.i.f. Pacific ports	2.35c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh	1.90c. to 2.00c.
Wider than 6 in., P'gh	1.80c. to 1.90c.
Wide strips, 24 in. to 48 in., P'gh	2.00c. to 2.15c.
6 in. and narrower, Chicago	2.10c.
Wider than 6 in., Chicago	2.00c.
Cooperage stock, P'gh	2.20c.
Cooperage stock, Chicago	2.30c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	2.20c.
Bars, f.o.b. Chicago	2.20c.
Bars, Cleveland	2.20c.
Bars, Buffalo	2.20c.
Shafting, ground, f.o.b. mill	*2.55c. to 3.50c.
Strips, P'gh	2.75c.
Strips, Cleveland	2.65c. to 2.75c.
Strips, del'd Chicago	3.05c.
Strips, Worcester	2.90c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	4.25c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Merchant Trade

	Base per Keg
Standard wire nails	$2.40 to $2.50
Cement coated nails	2.40 to 2.50
Galvanized nails	4.40 to 4.50

	Base per Lb.
Polished staples	2.85c. to 2.95c.
Galvanized staples	3.10c. to 3.20c.
Barbed wire, galvanized	3.05c. to 3.15c.
Annealed fence wire	2.55c. to 2.65c.
Galvanized wire, No. 9	3.00c. to 3.10c.
Woven wire fence (per net ton to retailers)	$65.00

To Manufacturing Trade

Bright hard wire, Nos. 6 to 9 gage	2.40c.
Spring wire	3.50c.

(Carload lots, f.o.b. Chicago)

Wire nails	$2.45 to $2.55 (keg)
Annealed fence wire	2.60c. to 2.70c. (lb.)
Bright hard wire to manufacturing trade	2.45c.

Anderson, Ind., mill prices are ordinarily $1 a ton over Pittsburgh base; Duluth Minn., mill $2 a ton over Pittsburgh, and Birmingham mill $3 a ton over Pittsburgh.

Cut Nails

	Per 100 Lb.
Carloads, Wheeling, Reading or Northumberland, Pa.	$2.70
Less carloads, Wheeling or Reading	2.80

Light Plates

No. 10, blue annealed, f.o.b. P'gh	2.10c. to 2.20c.
No. 10, blue annealed, f.o.b. Chicago dist.	2.30c.
No. 10, blue annealed, del'd Phila.	2.42c. to 2.52c.
No. 10, blue annealed, B'ham	2.35c.

Sheets

Blue Annealed

	Base per Lb.
No. 13, f.o.b. P'gh	2.25c. to 2.35c.
No. 13, f.o.b. Chicago dist.	2.45c.
No. 13, del'd Philadelphia	2.57c. to 2.67c.
No. 13, blue annealed, B'ham	2.50c.

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh	2.75c.
No. 24, f.o.b. Chicago dist. mill	2.85c.
No. 24, del'd Philadelphia	3.07c.
No. 24, f.o.b. Birmingham	3.00c. to 3.10c.

Metal Furniture Sheets

No. 24, f.o.b. P'gh	4.00c.

Galvanized

No. 24, f.o.b. Pittsburgh	3.40c.
No. 24, f.o.b. Chicago dist. mill	3.50c. to 3.60c.
No. 24, del'd Cleveland	3.59c.
No. 24, del'd Philadelphia	3.72c.
No. 24, f.o.b. Birmingham	3.65c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.90c. to 3.00c.
No. 28, f.o.b. Chicago dist. mill	3.00c. to 3.10c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh	3.90c.

Long Ternes

No. 24, 8-lb. coating, f.o.b. mill	3.90c. to 4.00c.

Vitreous Enameling Stock

No. 24, f.o.b. Pittsburgh	3.90c.

Tin Plate

	Per Base Box
Standard cokes, f.o.b. P'gh district mills	$5.25
Standard cokes, f.o.b. Gary	5.35

Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.70
15-lb. coating I.C.	13.40
20-lb. coating I.C.	14.60
25-lb. coating I.C.	$15.90
30-lb. coating I.C.	16.80
40-lb. coating I.C.	18.80

Alloy Steel Bars

(F.o.b. makers' mill)

Alloy Quality Bar Base, 2.65c. per Lb.

S.A.E. Series Numbers		Alloy Differential
2000	(½% Nickel)	$0.25
2100	(1½% Nickel)	0.55
2300	(3½% Nickel)	1.50
2500	(5% Nickel)	2.25
3100	Nickel Chromium	0.55
3200	Nickel Chromium	1.35
3300	Nickel Chromium	3.80
3400	Nickel Chromium	3.20
4100	Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100	Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600	Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel)	1.05
5100	Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100	Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100	Chromium Spring Steel	0.20
6100	Chromium Vanadium Bars	1.20
6100	Chromium Vanadium Spring Steel	0.95
9250	Silicon Manganese Spring Steel (flats)	0.25
	Rounds and squares	0.50
	Chromium Nickel Vanadium	1.50
	Carbon Vanadium	0.95

Above prices are for hot rolled steel bars, forging quality. The differential for cold-drawn bars is ¾c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Rails

	Per Gross Ton
Standard, f.o.b. mill	$43.00
Light (from billets), f.o.b. mill	36.00
Light (from rail steel), f.o.b. mill	34.00
Light (from billets), f.o.b. Ch'go mill	36.00

Track Equipment

	Base per 100 Lb.
Spikes, ⅝ in. and larger	$2.80
Spikes, ½ in. and smaller	2.80
Spikes, boat and barge	3.00
Tie plate, steel	2.15
Angle bars	$2.75
Track bolts, to steam railroads	$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count	70 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Butt Weld

Steel Inches	Black	Galv.	Iron Inches	Black	Galv.
⅛	45	19½	¼ and ⅜	+11	+36
¼ to ⅜	51	25½	½	23	5
½	56	42½	¾	28	11
¾	60	48½	1 and 1¼	31	15
1 to 3	62	50½	1½ and 2	35	18

Lap Weld

2	55	43½	2	23	9
2½ to 6	59	47½	2½ to 3½	28	13
7 and 8	56	43½	4 to 6	30	17
9 and 10	54	42½	7 and 8	29	16
11 and 12	53	40½	9 to 12	26	11

Butt Weld, extra strong, plain ends

¼	41	24½	2 to 3	61	50½
⅜ to ½	47	30½	¼ and ⅜	+13	+48
½	53	42½	½	23	7
¾	58	47½	¾	28	12
1 to 1½	60	49½	1 to 2	34	18

Lap Weld, extra strong, plain ends

2	53	42½	½	29	13
2½ to 4	57	46½	2½ to 4	34	20
4½ to 6	56	45½	4½ to 6	33	19
7 to 8	52	39½	7 and 8	31	17
9 and 10	45	32½	9 to 12	21	8
11 and 12	44	31½			

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel		Charcoal Iron	
2 in. and 2¼ in.	38	1¼ in.	1
2½ in.—2¾ in.	46	1¾ in.	8
3 in.	52	2 in.—2¼ in.	13
3¼ in.—3¾ in.	54	2½ in.—2¾ in.	16
4 in.	57	3 in.	17
4½ in. to 6 in.	46	3¼ in. to 3½ in.	18
		4 in.	20
		4½ in.	21

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	61	3 in.	46
1¼ to 1½ in.	53	3¼ to 3½ in.	48
1¾ in.	37	4 in.	51
2 to 2¼ in.	32	4½, 5 and 6 in.	40
2½ to 2¾ in.	40		

Hot Rolled

2 and 2¼ in.	38	3¼ to 3½ in.	54
2½ and 2¾ in.	46	4 in.	57
3 in.	52	4½, 5 and 6 in.	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gage take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30%, base (carloads)	55
Carbon, 0.30% to 0.40% base	50

Plus differentials for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.

Tubular Goods.—Gradual curtailment in operation over the last six weeks has brought this industry down to a schedule of about 40 per cent of capacity, which is about justified by present demand. Butt-weld business is seasonably slow, while orders for lap-welded material are mostly small. Seamless operations are little better, as the oil industry is not buying much, and warehouses in the oil country are well stocked. Mechanical tubing for automobile and airplane manufacturers is moving in restricted volume, although better releases are expected before the end of the month.

Wire Products.— Manufacturers' wire is moving at a somewhat better rate, but the products taken by jobbers are sluggish, and it will be several weeks before spring demand stimulates this business. Shipments of wire nails have again declined, recent activity having been prompted by the desire of jobbers to take out low-priced tonnage prior to the advancing of prices for the first quarter. Quotations of less than $2.40 to $2.50 a keg, Pittsburgh, have now generally disappeared in this district, and, if these figures continue to hold, it is likely that price advances may be announced for the second quarter. Manufacturers' wire is quoted at 2.40c., Pittsburgh, and annealed fence wire at 2.55c. to 2.65c.

Sheets.—The first few days of the month have brought a fair volume of tonnage releases and the amount of new orders is encouraging. As a result, sheet mills in the Pittsburgh and nearby districts have scheduled heavier operations this week, the rate for the industry being from 60 to 65 per cent of capacity. The leading interest plans to run its mills at 70 per cent, while at least one maker of automobile body and other special sheets expects to do equally well. Increased operations are made possible partly by the accumulation of orders over the last fortnight and partly by increased tonnage releases since the first of the year. The automobile industry is not yet taking sheets in any substantial way, but small orders from nearly all the prominent makers indicate that increasing activity can be expected before the end of the quarter. Warehouses have taken sheets freely in the last few days and many other users are placing business to bring their stocks up to normal after inventory-taking. New business is more restricted and price weakness may be blamed for the hesitancy of many buyers to place orders. Most of them really need to get under contract at this time as well as to place substantial current tonnage, but the incentive to buy is considerably reduced by the lack of confidence which even the mills have in the current price structure. On galvanized material, the 3.50c., Pittsburgh, price has practically disappeared and the market is quotable at 3.40c. This figure does not represent the absolute inside price to large jobbers, but is fairly representative of the market. Blue annealed sheets and light plates are still quotable at 2.25c. to 2.35c., and 2.10c. to 2.20c., respectively, for the No. 13 and 10 gages, with a small amount of business still going at the higher quotations. Shading of the 2.75c., Pittsburgh, price on black sheets is not uncommon, but is not widespread enough to justify quoting a lower figure in this district. Automobile body sheets are holding at 3.90c. to 4c., with little business to test the market, and metal furniture sheets at 4c., Pittsburgh.

Tin Plate.— Independent makers have followed the lead of the largest producer in reducing the contract price on tin plate from $5.35 to $5.25 a base box, Pittsburgh. This reduction occasioned considerable interest on account of the fact that the official tin plate price has not been changed except at the usual yearly intervals since 1921 and not in any normal year for more than 20 years. The decrease was not prompted by any lack of confidence in current or prospective demand for tin plate, as specifications are seasonably normal, and the container manufacturers do not expect any marked decrease in their requirements in 1930. Clarification of an undesirable price situation prompted the action, and, even though quotations already show more stability, a further decrease would not be unexpected if harmful price competition continued. Operations this week average about 70 per cent of capacity, with the leading interest running at about 83 per cent.

Strip Steel.—The turn of the year brought little increased tonnage to the strip makers, and the industry is running this week at well under 50 per cent of capacity. Some mills are averaging less than 40 per cent; the uneven distribution of tonnage makes difficult any close estimate. Automotive specifications are reaching this district in limited volume and the larger buyers still hesitate to place substantial orders. Price uncertainty may be partly responsible for this, but the chief strip consuming industry is by no means certain of its first quarter needs. Prices on hot-rolled material seem to be weaker than they were last month and some sellers are reported to be asking 1.90c. and 2c., Pittsburgh, on little except carload lots. The cold-rolled market seems to have settled to 2.65c. to 2.75c., Pittsburgh or Cleveland.

Cold-Finished Steel Bars.—Warehouse tonnage is reaching mills in slightly better volume, but the manufacturing trade has not increased its requirements to any noticeable extent and business in general is still very quiet. Some makers are quite free to admit that resumption of demand depends entirely upon the automobile industry. Other consuming lines are normally active and any slight interruptions in the last month will quickly be offset in January. Prices are holding satisfactorily at 2.20c., Pittsburgh.

Coal and Coke.—Production of furnace coke continues to decline, but only makers with large contracts are able to ship their entire output and some of them are seriously handicapped by reduced blast furnace operations. Prices are very soft, and some sellers are willing to contract ahead at much lower figures than they would ordinarily offer. On spot tonnage the market is still quotable at $2.60 to $2.65, Connellsville. Foundry coke shipments have increased slightly and occasional sales are reported. Prices are undetermined except on the premium brands, which are holding at $4.75 to $4.85, ovens. The market for domestic coke as well as coal is only fair, while industrial coal requirements are decidedly light.

Old Material.—The scrap market has taken a definite upward turn in the last week, and one mill in the district has paid $16.75 and $17 for a large tonnage of No. 1 heavy melting steel. Other sales at $16.50 clearly establish the market at a $16.50 to $17 level, an advance of $1 a ton since last week. Dealers are paying $16 and $16.25 to cover old orders taken at lower figures, and higher prices are being offered for shipments to mills which have bought in the last week. Part of this sudden activity is due to a rather sharp increase in the open-hearth operations of the smaller independent companies in this district, and even the larger mills are stepping up their steel-making units more rapidly than the finishing mills. This cuts down the production of their own scrap, and forces them to seek material in the open market. Stocks of scrap were also very low at the year end, and, although one or two buyers will not need to come into the market before February, most of the others are certain to need scrap by that time. Hydraulic compressed sheets have also sold at $17 to one mill, and this price is said to have been paid by another consumer. In

(*Concluded on page* 187)

Warehouse Prices, f.o.b. Pittsburgh

	Base per Lb.
Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.75c.
Cold-finished and screw stock—	
Rounds and hexagons	3.60c.
Squares and flats	4.10c.
Bands	3.25c.
Hoops	4.25c.
Black sheets (No. 24), 25 or more bundles	3.70c. to 3.80c.
Galv. sheets (No. 24), 25 or more bundles	4.35c. to 4.45c.
Light plates, blue annealed (No. 10), 1 to 24 plates	3.25c. to 3.35c.
Blue annealed sheets (No. 13), 1 to 24 sheets	3.40c. to 3.50c.
Galv. corrug. sheets (No. 28), per square	$4.33
Spikes, large	3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count	60 per cent off list
Machine bolts, 100 count	60 per cent off list
Carriage bolts, 100 count	60 per cent off list
Nuts, all styles, 100 count	60 per cent off list
Large rivets, base per 100 lb.	$3.50
Wire, black soft ann'd, base per 100 lb.	$2.90 to 3.00
Wire, galv. soft, base per 100 lb.	2.90 to 3.00
Common wire nails, per keg	2.80 to 2.90
Cement coated nails, per keg	2.95 to 3.05

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	$34.00
Rerolling, 4-in. and under 10-in., Youngstown	34.00
Rerolling, 4-in. and under 10-in., Cleveland	34.00
Rerolling, 4-in. and under 10-in., Chicago	35.00
Forging quality, Pittsburgh	39.00

Sheet Bars

(Open Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	$34.00
Youngstown	34.00
Cleveland	34.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

	Per Gross Ton
Pittsburgh	$34.00
Youngstown	34.00
Cleveland	34.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

	Per Lb.
Grooved	1.85c. to 1.90c.
Universal	1.85c. to 1.90c.
Sheared	1.85c. to 1.90c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	$40.00
Cleveland	40.00
Chicago	41.00

Prices of Raw Material

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40
Foreign Ore, c.i.f. Philadelphia or Baltimore	*Per Unit*
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algerian	12.00c.
Iron ore, low phos., Swedish, average 68% iron	12.00c.
Iron ore, basic Swedish, average 65% iron	10.00c.
Manganese ore, washed, 52% manganese, from the Caucasus	30.00c.
Manganese ore, Brazilian, African or Indian, basic 50%	30.00c.
Tungsten ore, high grade, per unit, in 60% concentrates	$15.25 to $16.50
	Per Gross Ton
Chrome ore, 45 to 50% Cr_2O_3, crude, c.i.f. Atlantic seaboard	$22.00 to $24.00
	Per Lb.
Molybdenum ore, 85% concentrates of MoS_2, delivered	50c. to 55c.

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville prompt	$2.60 to $2.65
Foundry, f.o.b. Connellsville prompt	3.50 to 4.75
Foundry, by-product, Ch'go ovens	8.00
Foundry, by-product, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, by-product, Phila.	9.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry by-prod., del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.25 to $1.75
Mine run coking coal, f.o.b. W. Pa. mines	1.50 to 1.75
Gas coal, ¾-in. f.o.b. Pa. mines	1.90 to 2.00
Mine run gas coal, f.o.b. Pa. mines	1.65 to 1.75
Steam slack, f.o.b. W. Pa. mines	80c. to 90c.
Gas slack, f.o.b. W. Pa. mines	1.00 to 1.10

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	$100.00
Foreign, 80%, Atlantic or Gulf port, duty paid	100.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$31.00 to $34.00
Domestic, 16 to 19%	29.00 to 32.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	$83.50
75%	130.00

	Per Gross Ton Furnace		*Per Gross Ton Furnace*
10%	$35.00	12%	$39.00
11%	37.00	14 to 16%	45.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

	Per Gross Ton		*Per Gross Ton*
10%	$30.00	12%	$34.00
11%	32.00		

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

	Per Gross Ton		*Per Gross Ton*
6%	$22.00 to $23.00	10%	$26.00 to $28.00
7%	23.00 to 24.00	11%	28.00 to 30.00
8%	24.00 to 25.00	12%	30.00 to 32.00
9%	25.00 to 26.00		

Other Ferroalloys

Ferrotungsten, per lb. contained metal del'd ..... $1.40 to $1.50
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads ..... 11.00c.
Ferrovanadium, per lb. contained vanadium, f.o.b. furnace ..... $3.15 to $3.65
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads $160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton $91.00
Ferrophosphorus, electric 24%, f.o.b. Anniston, Ala., per gross ton $122.50

Fluxes and Refractories

Fluorspar

	Per Net Ton
Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	$18.00
No. 2 lump, Illinois and Kentucky mines	20.00
Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid	$18.25 to 18.75
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silica, f.o.b. Illinois and Kentucky mines	32.50

Fire Clay Brick

	Per 1000 f.o.b. Works	
	High-Heat Duty Brick	Intermediate Heavy Duty Brick
Pennsylvania	$43.00 to $46.00	$35.00 to $38.00
Maryland	43.00 to 46.00	35.00 to 38.00
New Jersey	50.00 to 65.00	.....
Ohio	43.00 to 46.00	35.00 to 38.00
Kentucky	43.00 to 46.00	35.00 to 38.00
Missouri	43.00 to 46.00	35.00 to 38.00
Illinois	43.00 to 46.00	35.00 to 38.00
Ground fire clay, per ton	7.00	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$43.00
Chicago	52.00
Birmingham	50.00
Silica clay, per ton	$8.50 to 10.00

Magnesite Brick

	Per Net Ton
Standard sizes, f.o.b. Baltimore and Chester, Pa.	$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Standard size	45.00

Chrome Brick

	Per Net Ton
Standard size	$45.00

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts

Per 100 Pieces

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
†Machine bolts	70
†Carriage bolts	70
Lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads	70
Hot-pressed nuts, blank or tapped, square	70
Hot-pressed nuts, blank or tapped, hexagons	70
C.p.c. and t. square or hex. nuts, blank or tapped	70
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.

†Bolts with rolled thread up to and including ¼ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

	Per Cent Off List
Semi-finished hexagon nuts	70
Semi-finished hexagon castellated nuts, S.A.E.	70
Stove bolts in packages, P'gh	75, 20, 10 and 5
Stove bolts in packages, Chicago	75, 20, 10 and 5
Stove bolts in packages, Cleveland	75, 20, 10 and 5
Stove bolts in bulk, P'gh	75, 20, 10, 5 and 2½
Stove bolts in bulk, Chicago	75, 20, 10, 5 and 2½
Stove bolts in bulk, Cleveland	75, 20, 10, 5 and 2½
Tire bolts	60, 5 and 5

Discounts of 70 per cent off on bolts and nuts applied on carload business. For less than carload orders discounts of 55, 60 per cent apply.

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$3.10
F.o.b. Chicago	3.20

Small Rivets

(⅞-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 10
F.o.b. Cleveland	70 and 10
F.o.b. Chicago	70 and 10

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws	80, 10 and 5
Milled standard set screws, case hardened	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S. thread	85
Upset hex. cap screws, S.A.E. thread	85
Upset set screws	80, 10 and 5
Milled studs	70

Chicago

New Steel Business Shows Improvement and Ingot Operations Are a Shade Higher

CHICAGO, Jan. 7.—Ingot output in this district is a shade higher, following more liberal specifications from a wide circle of steel consumers. While some of this tonnage represents urgent needs because of low stocks in the hands of users, a fair part of it is the result of the activity of sellers, who are making a strong sales point of the advisability of rounding stocks now as an assurance against early spring needs, which they point out may not be promptly filled because of heavier demand and less favorable deliveries.

New sales of finished steel by a leading company compared favorably with some of the good weeks last year. This situation points to better rolling schedules, which sellers expect to see reflected in ingot output by the middle of the month. In the meantime 20 of 36 steel mill blast furnaces are in operation and ingots are being produced at 60 to 65 per cent of capacity, as producers reclaim cold metal which has been accumulating in recent weeks.

Price tendencies are taking various directions, depending on the commodity. Semi-finished steel is off $1 a ton in the local market. Quotations on wire are more stable, and competition for black sheets is less keen, with resultant disappearance of the low prices quoted a week ago. In plates, shapes and bars, buyers who are in position to place large and attractive tonnages are admitted to the preferred classification. Taken as a whole, this market presents the appearance of having made a slight turn for the better, though it is admitted in some quarters that efforts to hold prices and to arrange operations will present serious problems over the next two or three weeks.

Pig Iron.—Shipments of Northern foundry iron are gradually growing larger than those of the holiday season. Trouble which developed several weeks ago in a local merchant stack has been overcome, and all merchant furnaces in this district are now in blast. Production is in excess of shipments, which is not an unfavorable situation, as stocks have been unusually low over a period of months. Heavier accumulations at furnaces will afford more satisfactory service to consumers. A western Illinois melter is in the market for 1000 tons of iron, on which Southern interests have bid $13.50 a ton, Birmingham. The charcoal iron market is quiet. Northern iron at Chicago is firmly priced at $20 a ton, furnace, but at Milwaukee several lots have been placed at 75c. a ton under this figure.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25	$20.00
N'th'n No. 1 fdy., sil. 2.25 to 2.75	20.50
Malleable, not over 2.25 sil	20.00
High phosphorus	20.00
Lake Super. charcoal, sil. 1.50	27.04
S'th'n No. 2 fdy. (all rail)	$19.01 to 19.51
Low phos., sil. 1 to 2, copper free	29.50
Silvery, sil. 8 per cent	$28.79 to 29.79
Bess. ferrosilicon, 14-15 per cent	46.29

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Ferroalloys.—Demand for ferroalloys remains light. Large consumers of spiegeleisen are said to have sizable stocks on hand.

Semi-Finished Steel.—Several sizable lots have been ordered in this district at prices which are at least $1 a ton below recent quotations. Rerolling billets, 4 in. and under 10 in., are now quoted at $35 a ton, Chicago.

Structural Material.—The local structural market remains quiet as to tonnages placed, but projects that are taking shape give promise of an active market in the early spring. Architects are completing plans for two of the World's Fair buildings, on which, it is expected, bids will be taken in the early spring, with construction to start before summer. These will be permanent structures and will call for liberal use of steel. It is reported that the Phillips School, Chicago, which will require about 3300 tons, will soon be out for figures again, and plans are being prepared to rebuild the Lane Technical High School, in which 5000 tons of steel will be used. Inquiries from railroads have dropped off sharply, but engineering departments are busy and much new bridge work is expected by fabricators. Shops are operating at reduced schedules. Sharp competition for going tonnages has lowered prices for fabricated steel.

Mill prices on plain material, per lb.: 2.00c. base, Chicago.

Cast Iron Pipe.—Noteworthy in this week's business are orders for 8000 tons by Milwaukee, which made the following awards: 500 tons 6-in. to Lynchburg Foundry Co. at $42.70 a ton, delivered; 3500 tons of 8-in. to United States Pipe & Foundry Co. at $42.50; 2500 tons of 12-in. to James B. Clow & Sons at $42.75, and 1500 tons of 16-in. to Glamorgan Pipe & Foundry Co. at $42.50. There were also placed 500 tons of special fittings and 500 hydrants. The United States company is low bidder at $42.50 a ton on 118 tons of 36-in. pipe, on which Milwaukee opened bids Dec. 31. The freight rate from Birmingham to Milwaukee is $8.50 a ton. Cincinnati is opening bids this week on 160 tons of fittings, 1200 ft. of 4-in., 120,000 ft. of 6-in., 8000 ft. of 8-in., 9000 ft. of 10-in., and 2000 ft. of 12-in. pipe. Bismarck, Mo., is taking bids on 25,000 ft. of 4-in., 10,000 ft. of 6-in., and 2000 ft. of 8-in. Taken as a whole, this market is more active, but still is not up to the expectations of sellers, who find that seasonal buying by public utilities is unusually slow.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, $42.20; 4-in., $46.20; Class A and gas pipe, $3 extra.

Rails and Track Supplies.—The Burlington, after closing a week ago for 57,100 tons of rails for its own use, has awarded to the Colorado producer 10,650 tons of rails for use by the Colorado & Southern and the Fort Worth & Denver City. Releases of standard-section rails are heavier, and both mills in this district are now operating at 85 per cent of capacity. Two railroads have ordered a total of 13,000 tons of track accessories and a third buyer has taken 1500 tons of iron tie plates. Track supply business in the making will call for not less than 30,000 tons. Several small sales of light rails mark this week as one of the best in a month or more.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, $43; light rails, rolled from billets, $36. *Per lb.:* Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.07½c. to 2.15c.; angle bars, 2.75c.

Reinforcing Bars.—The only award of note this week is 450 tons for the Wabash Avenue bridge, Chicago. The market is dull, especially in awards. This, however, is not an unusual situation when winter weather prevails. Fresh inquiry, except for small tonnages, is not impressive, but many old requests for prices are still active. Architects and engineers report more work on drafting boards, but it will be a number of weeks before these projects will be estimated for bar tonnages. Many of the small tonnages being figured are for apartment buildings in suburban towns surrounding Chicago. Price structures are unchanged. Recent published quotations on lots up to 30 tons each of billet steel reinforcing bars out of Chicago warehouses have not been tested.

Sheets.—Demand for sheet mill products is broader. These new tonnages, plus the specifications held over from the old year, are now permitting hot mill output in the range of 50 to 60 per cent of capacity. Rolling schedules are shaping more rapidly than producers had expected. This is shown by the fact the mills at Milwaukee have resumed operations

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes	3.10c.
Soft steel bars	3.00c.
Reinforc'g bars, billet steel	1.95c. to 2.45c.
Reinforc'g bars, rail steel	1.80c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.60c.
Flats and squares	4.10c.
Bands (⅞ in. in Nos. 10 and 12 gages)	3.20c.
Hoops (No. 14 gage and lighter)	3.75c.
Black sheets (No. 24)	4.05c.
Galv. sheets (No. 24)	4.90c.
Blue ann'l'd sheets (No. 10)	3.35c.
Spikes, ⅜ in. and larger	3.55c.
Track bolts	4.55c.
Rivets, structural	4.00c.
Rivets, boiler	4.10c.

	Per Cent Off List
Machine bolts	60
Carriage bolts	60
Coach or lag screws	60
Hot-pressed nuts, sq., tap. or blank	60
Hot-pressed nuts, hex., tap. or blank	60
No. 8 black ann'l'd wire, per 100 lb.	$3.45
Com. wire nails, base per keg	$2.75 to 2.95
Cement c't'd nails, base per keg	2.75 to 2.95

after having been down about three weeks. Sellers are encouraged, although they have suddenly found that the jobbing trade is not only distributing smaller quantities, but that stocks in the hands of jobbers have grown and that releases from this source are measurably smaller. Prices for black sheets have firmed to 2.85c. a lb., Gary, the 2.75c. price having disappeared with the withdrawal from this district of several highly competitive sellers from east of Chicago. Gary prices on galvanized sheets are 3.50c. a lb. in tonnage lots, and 3.60c. for carload orders. Quotations on No. 10 light plates are firm at 2.30c., Chicago district mills.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.90c.; No. 24 galv., 3.55c. to 3.65c.; No. 10 blue ann'l'd, 2.35c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Wire Products.—Specifications are heavier than in the previous week, but this can hardly be taken as a true indication of market conditions, as a large share of these releases represents tonnage which accumulated during the inventory period at the end of the old year. Both the manufacturing and the jobbing trade continue to take wire and wire products at close range and press for prompt delivery, which mills can meet from well balanced stocks. Jobbers, especially in the Southern States, find distribution at a satisfactory winter rate. Severe winter weather in Texas has set back much outdoor work. Wire mill output is at 50 per cent of capacity. New business in electrical wire is lighter and backlogs, which still are satisfactory, are shrinking. The outlook for spring demand for this commodity is considered good. Most manufacturers of wire rope are anxious to book new orders.

Cold-Rolled Strip.—A few orders have been placed by automobile manufacturers, but the aggregate is not large, and output remains in the range of 25 to 30 per cent of capacity. Prices for cold-rolled strip range from 2.65c. to 2.75c. a lb., Cleveland, or to 2.95c. to 3.05c., delivered Chicago.

Plates.—This market is quiet in the absence of orders and inquiries for sizable tonnages. No business has developed in the week from oil producing districts, and it is said that needs of plates for pipe manufacture are lighter. Specifications from car shops remain steady, and the prospect for new business is good. Quotations on plates remain at 2c. a lb., Chicago. Deliveries are prompt on practically the full range of sizes rolled by local mills.

Old Material.—The Chicago scrap iron and steel market is still in the hands of brokers, who for the most part are convinced that higher prices will be obtainable in the near future. On this score, they continue to press for tonnages which can be applied against old orders and, accordingly, prices paid on brokers' trades are working higher. Open weather in recent days has tended to accelerate the flow of scrap. Railroads are moving cars with greater ease and yard operators and producers of scrap find preparation for market less costly. The result is that larger tonnages are appearing on track and, while this situation is somewhat offset by greater use in some scattered directions, the general effect is to work against higher prices. The cast iron borings market is quiet and shipments are restricted. Brokers will freely pay $10 a gross ton, delivered, for shipment against business taken at $9.50 to $9.75 a ton. Some sellers find the market more active in the matter of shipments, which were held in check during the closing days of the old year. Steel foundries in western Michigan are busier and are drawing on a wider territory for supplies of scrap. Local forge shops are only moderately engaged, and are offering little scrap. On the other hand, there is greater production by car shops.

Prices deliv'd Chicago district consumers:

Per Gross Ton	
Basic Open-Hearth Grades:	
Heavy melting steel	$12.75 to $13.25
Shoveling steel	12.50 to 13.00
Frogs, switches and guards, cut apart, and misc. rails	13.50 to 14.00
Hydraul. compressed sheets	11.00 to 11.50
Drop forge flashings	9.75 to 10.25
No. 1 busheling	11.00 to 11.50
Forg'd cast and r'l'd steel carwheels	17.50 to 18.00
Railroad tires, charg. box size	17.50 to 18.00
Railroad leaf springs cut apart	17.50 to 18.00
Acid Open-Hearth Grades:	
Steel couplers and knuckles	16.00 to 16.50
Coil springs	18.00 to 18.50
Electric Furnace Grades:	
Axle turnings	12.75 to 13.25
Low phos. punchings	15.00 to 15.50
Low phos. plates, 12 in. and under	15.00 to 15.50
Blast Furnace Grades:	
Axle turnings	10.50 to 11.00
Cast iron borings	9.50 to 10.00
Short shoveling turnings	9.25 to 9.75
Machine shop turnings	7.50 to 8.00
Rolling Mill Grades:	
Iron rails	14.50 to 15.00
Rerolling rails	14.50 to 15.00
Cupola Grades:	
Steel rails less than 3 ft.	16.50 to 17.50
Steel rails less than 2 ft.	18.50 to 19.00
Angle bars, steel	15.25 to 15.75
Cast iron carwheels	13.75 to 14.25
Malleable Grades:	
Railroad	16.25 to 16.75
Agricultural	14.50 to 15.00
Miscellaneous:	
*Relaying rails, 56 to 60 lb.	23.00 to 25.00
*Relaying rails, 65 lb. and heav.	26.00 to 31.00
Per Net Ton	
Rolling Mill Grades:	
Iron angle and splice bars	15.00 to 15.50
Iron arch bars and transoms	17.00 to 17.50
Iron car axles	25.50 to 26.00
Steel car axles	15.75 to 16.25
No. 1 railroad wrought	12.00 to 12.50
No. 2 railroad wrought	11.25 to 11.75
No. 1 busheling	9.00 to 9.50
No. 2 busheling	7.00 to 7.50
Locomotive tires, smooth	15.50 to 16.00
Pipes and flues	9.50 to 10.00
Cupola Grades:	
No. 1 machinery cast	13.50 to 14.00
No. 1 railroad cast	12.50 to 13.00
No. 1 agricultural cast	12.00 to 12.50
Stove plate	10.50 to 11.00
Grate bars	10.75 to 11.25
Brake shoes	10.50 to 11.00

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

Bars.—Sales of mild steel bars are up sharply and releases also are larger. Greater pressure for deliveries is coming from some of the automobile parts makers, several of which find their schedules heavier than had been anticipated two weeks ago. Prices generally are holding well at 2c., Chicago, though there is an inclination on the part of sellers to widen the circle of preferred buyers when tonnages are desirable. Although specifications for alloy steel bars are somewhat larger, there has been no marked change in the rate of production. The iron bar market is quiet. The price of 2c., Chicago, is virtually nominal in view of a sharp increase in the number of preferred buyers. The rail steel bar market is without feature. Operations are still on a double turn basis, but at reduced hours per turn.

Bolts, Nuts and Rivets.—Discounts remain steady at 70 per cent off list for machine bolts and nuts and 70 and 10 per cent off for small rivets. Specifications from miscellaneous sources are larger in the aggregate, but output remains at its recent rate, as producers have well-rounded stocks.

Coke.—Spot purchases of by-product foundry coke are fairly numerous. Prices are steady at $8 a ton, f.o.b. local ovens, and $8.75, delivered in Chicago.

Incandescent Lamp Sales in 1929

Sales of incandescent lamps in the United States during 1929 were approximately 340,000,000 large and 292,000,000 small lamps, according to a review of the electrical industry for the year by John Liston, of the General Electric Co. This is an increase of 18,000,000, or a little over 5½ per cent, in the large sizes over the previous year, and an increase of 37,000,000, or 14½ per cent in the small sizes.

On March 1, 50 and 60-watt standard lighting lamps of the 115-volt group were reduced in list price from 22 to 20 cents so that the 20-cent price now covers all the generally used lamps up to and including the 60-watt size. The price trend for lamps has been downward for a number of years; the present prices being less than half the so-called pre-war figure.

Suit has been filed in common pleas court at Youngstown by Philip Wick, Laura Wick and other heirs of the Myron C. Wick Estate, asking for receivership for the Youngstown Boiler & Tank Co. and dissolution of the company. The suit is directed against James P. Keene, president of the company and associates. The plaintiff contends that the directors are evenly divided as to the policy to be pursued, and maintains that if the policies of the present management are continued, they will place the company in danger of insolvency. The company occupies a large plant on Oak Street, Youngstown, which it purchased several years ago from the United Engineering & Foundry Co., Pittsburgh.

New York

Steel Price Structure Shows Signs of Weakness—Pig Iron Not Recovered from Lull

NEW YORK, Jan. 7.—The pig iron market has not recovered from the holiday lull. Many foundries are still idle for inventories and others are operating at reduced rates. The average for nearby New Jersey melters is placed at 50 per cent, compared with 85 per cent throughout most of last year. Buying is limited to spot tonnages, bookings for the week totaling 6500 tons. The only large inquiry, that of the General Electric Co., is still open. The price structure is softer, with waiving of silicon differentials becoming more common. Uncertainty as to the extent of their operations in this quarter accounts, in part, for the failure of melters to contract for their forward requirements. The Worthington Pump & Machinery Corporation is in the market for a few hundred tons for its Buffalo plant, while the National Radiator Corporation wants 250 tons for January shipment to its Dunkirk, N. Y., foundry.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil. 1.75 to 2.25	$21.91 to $22.41
*Buff. No. 2, del'd east. N. J.	20.28 to 20.78
East. Pa. No. 2 fdy., sil. 1.75 to 2.25	19.89 to 21.02
East. Pa. No. 2X fdy., sil. 2.25 to 2.75	20.39 to 21.52

Freight rates: $4.91 from Buffalo, $1.39 to $2.52 from eastern Pennsylvania.
*Prices delivered to New Jersey cities having rate of $3.28 a ton from Buffalo.

Finished Steel.—Steel prices, which held fairly steady during December, when there was very little to quote on, are developing irregularity as demands increase moderately. Some of the irregularity is in certain well-defined cases, where the tonnage is especially attractive at this time, and therefore has not yet affected the situation to the extent of permitting the marking down of published quotations, but the present instability points to the likelihood that the next few weeks may well bring either official reductions of $1 or $2 a ton on some products or a stiffening tendency that will restore the quotations regarded as in effect at the end of the old year. Steel bars are nominally quoted at 1.90c., Pittsburgh, and this price, in fact, applies to a good deal of the current business, but enough sales have been made at 1.85c. to bring the 1.90c. price into question. Likewise, on plates, concessions of $1 a ton from 2c., Coatesville, are obtainable on desirable tonnages. The structural steel market presents a variety of quotations, indicating that sharp competition has developed recently on projects of good size. While the market range is nominally 2.09½c. to 2.14½c., New York, these prices are subject to pressure. Following the decline on automobile body sheets of $2 a ton to 3.90c., Pittsburgh, other grades have shown further weakness. Black sheets have been sold at 2.70c., with indications that 2.65c. has been done in a few instances. Galvanized sheets are not strong at 3.40c., Pittsburgh, concessions of at least $1 a ton having been granted. Blue annealed sheets from jobbing mills have become better stabilized at 2.25c. for No. 13 gage and 2.10c. for No. 10 gage, but the competition of the continuous mills in widths from 24 to 48 in. is keenly felt by the jobbing mills. Wire and wire nails are also very weak. At the opening of bids on Jan. 2 by the New York Central Railroad, prices on various steel products were fairly uniform, except that the Youngstown Sheet & Tube Co. quoted 1.85c., Youngstown, on plates and bars. A jobber quoted $2 a ton less than most of the mills on sheets. The past week's business included 40,000 base boxes of tin plate placed by an oil company.

Mill prices per lb., deliv'd New York: Soft steel bars, 2.24c.; plates, 2.12½c. to 2.17½c.; structural shapes, 2.09½c. to 2.14½c.; bar iron, 2.14c.

Reinforcing Bars.—The only important award during the last week was 700 tons to the McClintic-Marshall Co. for route 107, section 10, Brooklyn subway.

Cast Iron Pipe.—Most of the current inquiry is from private companies, but a number of municipalities are preparing specifications covering their spring requirements. The United Gas Improvement Co., Philadelphia, is expected to close this week on 7000 tons of pipe, and the American Construction & Securities Co., New York, is in the market for a substantial tonnage. Stevens & Wood, New York, are preparing to ask for bids on pipe for the Allied Light & Power Corporation. The Federal Water Service Co., New York, has closed on about 4000 tons of pipe with two makers. Prices on attractive tonnages are still lacking in firmness.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, $34.60 to $36.60; 4-in. and 5-in., $37.60 to $39.60; 3-in., $44.60 to $46.60. Class A and gas pipe $3 extra.

Warehouse Business.—Effective Jan. 3, warehouses in this district have increased the extras for gage on blue annealed sheets. No. 10 gage is retained as the base, but the extra for No. 12 gage has been advanced from 5c. a 100 lb. to 10c.; on No. 14 gage from 10c. a 100 lb. to 20c., and on No. 16 gage from 20c. to 30c. The base price from warehouse continues at 3.90c. a lb., but this is subject to concessions up to 65c. a 100 lb.

Coke.—Buying for prompt shipment is small, but consumers are accepting shipments of both foundry and furnace grades on contracts. Furnace coke for prompt delivery is lacking in strength, with prices ranging from $2.65 to $2.75 a ton, Connellsville. Special brands of beehive foundry coke are unchanged at $4.85 a net ton, ovens, or $8.56, delivered to northern New Jersey, Jersey City and Newark, and $9.44 to New York and Brooklyn. By-product coke is quoted at $9 to $9.40 a net ton, Newark or Jersey City, and $10.06, New York or Brooklyn.

Old Material.—Buying by consumers continues light. Prices of all

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes	3.30c.
Soft steel bars, small shapes	3.25c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons	3.50c.
Flats and squares	4.00c.
Cold-roll. strip, soft and quarter hard	5.15c. to 5.40c.
Hoops	4.25c.
Bands	3.75c.
Blue ann'l'd sheets (No. 10)	3.25c. to 3.90c.
Long terne sheets (No. 24)	5.80c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galv. annealed	5.15c.
Tire steel, ½ x ½ in. and larger	3.40c.
Smooth finish, 1 to 2½ x ¾ in. and larger	3.75c.
Open-hearth spring steel, bases,	4.50c. to 7.00c.

	Per Cent Off List
Machine bolts, cut threads:	
¾ x 6 in. and smaller	60
1 x 30 in. and smaller	50 to 50 and 10
Carriage bolts, cut thread:	
½ x 6 in. and smaller	60
¾ x 20 in. and smaller	50 to 50 and 10
Coach Screws:	
½ x 6 in. and smaller	60
1 x 6 in. and smaller	50 to 50 and 10

Boiler Tubes—	Per 100 Ft.
Lap welded, 2-in.	$17.33
Seamless steel, 2-in.	20.24
Charcoal iron, 2-in.	25.00
Charcoal iron, 4-in.	67.00

Discounts on Welded Pipe

Standard Steel—	Black	Galv.
⅛-in. butt	46	29
¼-in. butt	51	37
1-3-in. butt	53	39
2½-6-in. lap	48	35
7 and 8-in. lap	44	17
11 and 12-in. lap	37	12
Wrought Iron—		
⅛-in. butt	5	+19
¾-in. butt	11	+ 9
1-1½-in. butt	14	+ 6
2-in. lap	5	+14
3-6-in. lap	11	+ 6
7-12-in. lap	3	+16

Tin Plate (14 *x* 20 *in.*)

	Prime	Seconds
Coke, 100 lb. base box	$6.45	$6.20
Charcoal, per Box—	A	AAA
IC	$9.70	$12.10
IX	12.00	14.25
IXX	13.90	16.00

Terne Plate (14 *x* 20 *in.*)

IC—20-lb. coating	$10.00 to $11.00
IC—30-lb. coating	12.00 to 13.00
IC—40-lb. coating	13.75 to 14.25

Sheets, Box Annealed—Black, C. R. One Pass

	Per Lb.
Nos. 18 to 20	3.70c.
No. 22	3.85c.
No. 24	3.90c.
No. 26	4.00c.
No. 28*	4.15c.
No. 30	4.40c.

Sheets, Galvanized

	Per Lb.
No. 14	4.15c.
No. 16	4.00c.
No. 18	4.15c.
No. 20	4.25c.
No. 22	4.35c.
No. 24†	4.50c.
No. 26	4.75c.
No. 28*	5.00c.
No. 30	5.40c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.
†For 50 bundles or more, 25c. per 100 lb. less.

grades of scrap are generally unchanged. No. 2 heavy melting steel is being shipped on contracts to consumers at Conshohocken, Phoenixville and Harrisburg, Pa. No. 1 heavy melting steel is moving to mills at Coatesville, Pa., and Claymont, Del. The consumer at Bethlehem, Pa., has received heavy shipments of scrap in the past few weeks and has asked for suspension of further deliveries of heavy melting steel on contracts until cars at the plant are unloaded. With brokers buying heavy breakable cast for a Harrisburg, Pa., user, at $13.50 a ton, delivered, the market is quotable at $9.75 to $10.50, New York.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel	$10.50 to	$11.35
Heavy melting steel (yard)	7.50 to	8.00
No. 1 hvy. breakable cast	9.75 to	10.50
Stove plate (steel works)		8.00
Locomotive grate bars		8.25
Machine shop turnings	7.00 to	7.50
Short shoveling turnings	7.25 to	7.50
Cast borings (blast fur. or steel works)	7.00 to	7.50
Mixed borings and turnings	6.75 to	7.50
Steel car axles	15.25 to	16.25
Iron car axles	20.50 to	21.00
Iron and steel pipe (1 in. dia., not under 2 ft. long)	9.25 to	9.75
Forge fire	8.50 to	9.00
No. 1 railroad wrought	11.50 to	12.50
No. 1 yard wrought, long	10.50 to	11.50
Rails for rolling	10.50 to	11.00
Stove plate (foundry)	8.25 to	8.50
Malleable cast (railroad)	12.50 to	13.00
Cast borings (chemical)	8.50 to	9.50

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast	$15.00
No. 1 hvy. cast (columns, bldg. materials, etc.), cupola size	13.00
No. 2 cast (radiators, cast boilers, etc.)	12.50

Battery Locomotives and Power Trucks

Much information regarding storage battery locomotives and power trucks is contained in Bulletin 313 of the United States Bureau of Mines, which describes and illustrates in 120 pages a number of self-propelled units for industrial use which have been listed by the bureau as permissible for coal and other mines. The product of eight manufacturers was covered in the investigations, and approvals have been granted for 16 locomotives and seven power trucks or locomotives fitted for supplying power to other machines. In nearly all cases these approved units represent equipment in practical use in gassy mines. The bulletin gives much detail as to control features and means for avoiding accident.

Warehouse Prices, f.o.b. Cleveland

	Base per Lb.
Plates and struc. shapes	3.00c.
Soft steel bars	3.00c.
Reinforc. steel bars	2.25c. to 2.50c.
Cold-fin. rounds and hex.	3.65c.
Cold-fin. flats and sq.	4.15c.
Hoops and bands, No. 12 to ¼ in., inclusive	3.25c.
Hoops and bands, No. 13 and lighter	3.65c.
Cold-finished strip	*5.95c.
Black sheets (No. 24)	3.70c. to 3.90c.
Galvanized sheets (No. 24)	4.60c. to 4.75c.
Blue ann'l'd sheets (No. 10)	3.25c.
No. 9 ann'l'd wire, per 100 lb.	$2.65
No. 9 galv. wire, per 100 lb.	3.00
Com. wire nails, base per keg	2.65

*Net base, including boxing and cutting to length.

Cleveland

Steel Orders Heavier Because of Increased Automobile Demands and Stock Replenishment by Other Consumers

CLEVELAND, Jan. 7.—Orders for finished steel in nearly all forms showed a very satisfactory gain during the week. The increase is due to the stepping up of the automotive industry and to the placing of orders to replenish stocks. Consumers allowed their stocks to be about cleaned out at the end of the year and, with inventories over, they are now building them up in a moderate way. While better demand is largely for steel bars, sheets and strip steel going to the automotive industry, mills are getting new specifications from diversified industries. Automobile manufacturers which recently sent out inquiries for parts have placed a fair volume of orders, enabling forge shops and stamping plants in this territory to increase operations, and stimulating orders for steel from these sources. Purchases direct by automobile companies have increased, but motor car manufacturers are confining their buying to comparatively small lots for early needs.

The Nickel Plate Railroad is placing 29,860 tons of rails for its 1930 requirements, or somewhat more than last year.

Recent buying by the automotive industry has offered a test in prices on sheets and strip steel and brought out concessions in the Michigan territory that have extended to this market. As a result, a general reduction of $2 a ton to 3.90c., Pittsburgh, has been made on auto body sheets, and the low prices that appeared on continuous mill sheets a few weeks ago are again in evidence.

Pig Iron.—Sales have increased somewhat, particularly in the Michigan territory, where some of the automotive foundries have come into the market. However, considerable iron bought by this industry, as well as other consumers, for the last quarter, has been carried over into the present quarter. Cleveland interests sold 22,000 tons during the week in foundry and malleable iron in lots up to 1000 tons. The market in this immediate territory is very dull. Some of the smaller foundries do not seem convinced that present prices will hold and are buying from month to month instead of for the quarter. Southern foundry iron is being freely offered by a leading producer at $13.50, Birmingham, for shipment to points north of the Ohio River. Shipping orders show a moderate increase over those of the first week of December. Some of the automotive foundries that have taken no iron for several weeks are getting busier and have issued releases. Prices are firm and unchanged. Foundry and malleable iron are quoted at $18.50, Cleveland, for outside shipment, $19, furnace, for local delivery and $19.50 to $20 for Michigan shipment.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25		$19.50
S'th'n fdy., sil. 1.75 to 2.25	$19.51 to	20.51
Malleable		19.50
Ohio silvery, 8 per cent		28.00
Basic Valley furnace		18.50
Stand. low phos., Valley	26.50 to	27.00

Prices except on basic and low phosphorus are delivered Cleveland. Freight rates: 50c. from local furnaces; $3 from Jackson, Ohio; $6.01 from Birmingham.

Semi-Finished Steel.—Specifications for sheet bars show a moderate increase, but the demand for slabs and billets continues very slow. A local mill has closed contracts with part of its trade for the first quarter at $34, Cleveland and Youngstown. Some consumers have not yet taken out all the steel covered by their last quarter contracts.

Strip Steel.—Price irregularities on hot-rolled strip that developed in the Detroit territory have become more pronounced and have spread to this territory. Mills need tonnage, and some of the orders have been placed at concessions of $2 a ton, or 1.80c., Pittsburgh, for wide strip and 1.90c. for narrow. There has also been some weakening to 2.65c., Cleveland, for cold-rolled strip. Orders for both hot and cold-rolled material show an increase and several of the mills are operating a little better this week than last.

Bars, Plates and Shapes.—Specifications for steel bars showed quite an improvement the past week, and considerable new inquiry has come out for fair-sized lots. Plates also are moving somewhat better, but structural shapes continue quiet. Locomotive works have issued inquiries for 5200 tons of plates that will be required for the 130 locomotives that the Van Sweringen interests are to purchase for the Chesapeake & Ohio, Pere Marquette and Hocking Valley railroads. Nickel steel will be used for part of the boiler shells. Steel bars are unchanged at 1.85c. to 1.95c., Cleveland, and many consumers have contracted for the quarter at the higher price. Plates are being well maintained at 1.90c., Pittsburgh, although there has been a little shading to 1.85c. Structural shapes are firm at 1.90c., Pittsburgh.

Sheets.—Tonnage increased during the week, and some of the producers put additional mills in operation. The gain is largely from the automotive industry, which is issuing specifications for shipments through January and in some cases into February. Weakness in prices has extended to this district. Automobile body sheets have been definitely established at 3.90c., Pittsburgh, a decline of $2 a ton. Concessions to 2c. for No. 10 and 2.15c. for No. 13 are being made by continuous mills for blue annealed sheets, but jobbing mills are holding

to $2 a ton higher as a minimum. As low as 2.65c. has been named for black sheets for immediate rolling, although some of the mills do not want orders at 2.75c., claiming that price is unprofitable. On galvanized sheets, 3.40c. is the ruling price, although as low as 3.35c. has been quoted.

Rails.—The Nickel Plate Railroad yesterday issued an inquiry for 29,860 tons of steel rails. Of the total, about 60 per cent, or over 18,000 tons, will be placed outright and an option is being taken on the remainder. The tonnage, it is expected, will be divided about equally among the Carnegie, Illinois, Bethlehem and Inland companies.

Wire Products. — The market is more active than in several weeks. A number of jobbers and consumers placed first quarter contracts during the week at the regular price of 2.40c., Cleveland, for wire and $2.40 a keg for nails. A fair volume of specifications came out.

Warehouse Business. — Jobbers' sales, which were very light through December, have picked up considerably. Business is well distributed among various products, and many of the orders are for fair-sized lots. Prices are firm.

Coke. — Activity in foundry coke continues rather light, although there has been some contracting for the first quarter. Domestic by-product coke is moving slowly because of the mild weather, and there is some irregularity in prices. Ohio by-product foundry coke is quoted at $8.25, ovens, for January shipment.

Old Material. — The market has a firmer tone in the Valley district, where dealers are paying $15.75 for No. 1 heavy melting steel, or 25c. a ton higher than a week ago. Locally, there is no activity. Cleveland mills have heavy stocks and still have considerable scrap due on last year's contracts. Shipments on steel-making grades are still being held up, but one mill continues to take blast furnace scrap. Dealers are paying $10 for blast furnace grades for Cleveland delivery. Prices are holding at recent levels except on short shoveling turnings, which have declined 50c. a ton.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$13.50 to $14.00
No. 2 heavy melting steel	13.00 to 13.50
Compressed sheet steel	12.50 to 13.00
Light bundled sheet stampings	11.50 to 12.00
Drop forge flashings	11.50 to 12.00
Machine shop turnings	9.00 to 9.50
Short shoveling turnings	10.50 to 11.00
No. 1 railroad wrought	13.00 to 13.50
No. 2 railroad wrought	14.00 to 14.50
No. 1 busheling	12.00 to 12.50
Pipes and flues	9.00 to 9.50
Steel axle turnings	12.50 to 13.00
Acid Open-Hearth Grades:	
Low phos., forging crops	17.75 to 18.00
Low phos., billet, bloom and slab crops	18.50 to 18.75
Low phos., sheet bar crops	18.00 to 18.50
Low phos., plate scrap	18.00 to 18.50
Blast Furnace Grades:	
Cast iron borings	9.75 to 10.00
Mixed borings and short turnings	9.75 to 10.00
No. 2 busheling	9.75 to 10.00
Cupola Grades:	
No. 1 cast	15.25 to 15.75
Railroad grate bars	11.00 to 12.00
Stove plate	12.00 to 12.50
Rails under 3 ft.	18.50 to 19.50
Miscellaneous:	
Railroad malleable	18.00 to 18.50
Rails for rolling	16.25 to 16.50

makers are in an improved position, stocks of pipe on yards being 4000 to 5000 tons lower than a year ago.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	$20.76 to $21.76
East. Pa. No. 2, 2.25 to 2.75 sil.	21.26 to 22.26
East. Pa. No. 1X	21.72 to 22.76
Basic (del'd east. Pa.)	19.50 to 19.75
Malleable	21.25 to 21.75
Stand. low phos. (f.o.b. east Pa. furnace)	24.00
Cop. b'r'g low phos. (f.o.b. furnace)	23.00 to 24.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.29
Va. No. 2X, 2.25 to 2.75 sil.	22.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to $1.64 from eastern Pennsylvania furnaces; $4.54 from Virginia furnaces.

Billets.—Consumers have a good supply of material in stock from their fourth quarter contracts, and at present rates of operation will not require additional supplies for some weeks. When buyers have asked for first quarter contract prices, mills have quoted $34 a ton, Pittsburgh, on rerolling billets and $39 a ton, Pittsburgh, on forging grade.

Bars.—Buying is generally limited to less than carload lots, for which 1.90c. a lb., Pittsburgh, or 2.22c., delivered Philadelphia, is obtained. On larger business, mills have begun to offer concessions of $1 a ton to 1.85c., Pittsburgh, or 2.17c., delivered Philadelphia.

Shapes.—Mills are quoting on a fair tonnage of new business, but have only a small tonnage on their books. Prices continue irregular, ranging from 1.85c. to 1.90c., f.o.b. nearest mill to consumer, or 1.91c. to 1.96c. a lb., delivered Philadelphia. The Pennsylvania Railroad has opened bids on 12,000 tons of electrification material, but award has not yet been made.

Reinforcing Bars.—A number of projects requiring substantial tonnages of bars are pending, but few awards have been reported in the past week. The Reading Railroad has placed upward of 80 tons of rail steel bars for Twelfth and York Streets

Philadelphia

Plates, Bars and Sheets Show $1 a Ton Decline—Low Phosphorus Pig Iron In Demand

PHILADELPHIA, Jan. 7.—While there has been a slight improvement in steel inquiry since the holiday lull, mills have little unfilled tonnage on their books and are showing increasing willingness to grant concessions on substantial orders for early delivery. The plate market is unsettled, and large users are obtaining concessions of $1 a ton, with several dollars a ton granted to shipyards. Steel bar prices are also being shaded by mills in need of tonnage, and sheet prices show a tendency toward lower levels. The Pennsylvania Railroad has opened bids on 270 tons of steel pipe for first quarter and 12,000 tons of structural material for electrification work.

Pig Iron. — Eastern Pennsylvania furnaces have been accumulating foundry iron in the past few weeks, but are maintaining prices with only occasional concessions on desirable business. First quarter contracting has represented only a small part of normal requirements, but a number of buyers are evidently intending to cover their needs as they arise. Low phosphorus iron is in fairly active demand, with the Baldwin Locomotive Works inquiring for about 1000 tons and the Standard Steel Works Co., Burnham, Pa., for 3000 to 4000 tons. The Washington Navy Yard has awarded 500 tons of low phosphorus to an importer of British iron. The Brooklyn Navy Yard has placed 200 tons of low phosphorus with an eastern Pennsylvania furnace. The Virginia furnace interest continues to quote competitive prices on foundry iron in the Cumberland Valley, but has not yet booked any large tonnages. One of the Virginia cast iron pipe makers has increased a recent contract for 3000 tons of No. 2 and No. 3 foundry iron to a total of 5000 tons. Eastern Pennsylvania soil pipe

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier	2.70c.
Plates, ⅜-in.	2.90c.
Structural shapes	2.70c.
Soft steel bars, small shapes, iron bars (except bands)	2.80c.
Round-edge iron	3.50c.
Round-edge steel, iron finished 1½ x 1½ in.	3.50c.
Round-edge steel planished	4.30c.
Reinforc. steel bars, sq., twisted and deform.	2.60c. to 2.80c.
Cold-fin. steel, rounds and hex.	3.50c.
Cold-fin. steel, sq. and flats	4.00c.
Steel hoops	3.55c.
Steel bands, No. 12 to ⅛-in. inclus.	3.30c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.90c.
†Galvanized sheets (No. 24)	4.65c.
Light plates, blue annealed (No. 10)	3.25c.
Blue ann'l'd sheets (No. 13)	3.40c.
Diam. pat. floor plates—	
¼-in.	5.30c.
⅜-in.	5.50c.
Rails	3.20c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

with the Danville Structural Steel Co. Prices continue at about 1.95c., Pittsburgh, or 2.27c., delivered Philadelphia, for billet steel bars and 1.85c. to 1.95c., Franklin, Pa., or Tonawanda, N. Y., or 2.17c. to 2.27c., delivered Philadelphia, for rail steel bars. On both grades the extra for cutting to length is omitted.

Plates. — Concessions have been granted from 2c. a lb., Coatesville, or 2.10c., delivered Philadelphia, shipbuilders having been quoted concessions of $2 to $3 a ton and other large users $1 a ton, depending upon the desirability of the tonnage. Although there is a substantial plate tonnage in prospect for shipbuilding during this year, mills are at present in need of specifications for early shipment.

Sheets.—Consumers of sheets in this district, especially automobile body builders, are increasing operating rates. Radio manufacturers have also advanced their output slightly, although this is usually the quiet period of the year in that industry. Sheet prices generally show lack of strength whenever specifications for immediate delivery are offered by buyers, but on first quarter contracts mills are less inclined to offer concessions in price. Blue annealed sheets range from 2.25c. to 2.35c. a lb., Pittsburgh, or 2.57c. to 2.67c., delivered Philadelphia, for No. 13 gage, and blue annealed plates from 2.10c. to 2.20c., Pittsburgh, or 2.42c. to 2.52c., delivered Philadelphia, for No. 10 gage. Concessions of about $2 a ton from the minimum quotation are granted by certain sellers to preferred buyers. Black sheets are quoted at 2.65c. to 2.70c., Pittsburgh, or 2.97c. to 3.02c., Philadelphia, and 2.60c., Pittsburgh, or 2.92c., delivered Philadelphia, has been quoted to large users. Galvanized sheets are quoted at 3.40c., Pittsburgh, or 3.72c., Philadelphia, but when specifications for prompt shipment are offered $1 a ton concessions have been given.

Imports.—In the week ended Jan. 4, 850 tons of chrome ore was received at this port from Greece and 299 tons of pig iron from British India. Steel arrivals consisted of 37 tons of steel bars from Belgium, 25 tons from Germany and seven tons from Sweden, 40 tons of iron bars from Belgium and 17 tons from Sweden, 26 tons of steel hoops from Belgium and one ton from the Netherlands, 560 tons of strip steel from France, 144 tons of structural shapes from Belgium and 14 tons from Germany, 17 tons of steel ball rods from Sweden and 511 tons of steel blooms from France. Scrap imports consisted of 28 tons from the United Kingdom and 10 tons from Germany.

Old Material.—Suspension of deliveries of No. 1 heavy melting steel, possibly for the rest of the current month, by the consumer at Bethlehem, Pa., has increased the available supply of this grade for shipment to other mills, so that brokers are encountering no difficulty in filling contracts at the present price level. About 3000 tons of No. 1 heavy melting steel has been bought in the Baltimore district at $13.50 a ton, delivered Sparrows Point, Md. Other grades of scrap are inactive, and prices are lacking in strength.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	$14.50
Scrap T rails	14.00
No. 2 heavy melting steel	$12.00 to 12.50
No. 1 railroad wrought	15.00 to 15.50
Bundled sheets (for steel works)	11.50
Hydraulic compressed, new	13.00
Hydraulic compressed, old	12.00 to 12.50
Machine shop turnings (for steel works)	11.00
Heavy axle turnings (or equiv.)	12.50 to 13.00
Cast borings (for steel works and roll. mill)	11.00
Heavy breakable cast (for steel works)	13.50 to 14.00
Railroad grate bars	11.00 to 11.50
Stove plate (for steel works)	11.00 to 11.50
No. 1 low phos., hvy., 0.04% and under	20.50 to 21.50
Couplers and knuckles	19.00 to 19.50
Rolled steel wheels	19.00 to 19.50
No. 1 blast f'nace scrap	10.50 to 11.00
Wrot. iron and soft steel pipes and tubes (new specific.)	14.00
Shafting	19.00
Steel axles	20.00 to 21.00
No. 1 forge fire	13.00 to 13.50
Cast iron carwheels	15.00
No. 1 cast	15.00 to 15.50
Cast borings (for chem. plant)	14.00 to 14.50
Steel rails for rolling	15.00 to 15.50

Upholds Pig Iron Rate

WASHINGTON, Jan. 7.—Dismissing a complaint made by the Vulcan Mold & Iron Co., Latrobe, Pa., the Interstate Commerce Commission in a decision made public last Friday held that the rate of $2.02 a gross ton on pig iron from Hubbard, Ohio, and other points in the Mahoning and Shenango valleys to Latrobe is not unreasonable.

Coal officials from various sections of the country will meet at Pittsburgh on Jan. 11 to begin active preparations on behalf of the Manufacturers Division of the American Mining Congress for its seventh annual convention of practical coal operating men and national exposition of coal mining machinery, equipment and supplies which will be held at Cincinnati the week of May 5.

Pittsburgh Market

(*Concluded from page* 180)

Detroit, the market on this grade has gone up sharply in recent weeks, and the above quotation would be entirely in line with the prices now being paid in Detroit, plus the freight rate. Machine shop turnings have been sold at a figure at least $1 higher than recent quotations, and, although sales of other grades of scrap have not been active, the market generally is stronger. The railroad lists which close this week are expected to reflect the strength of the market. The Pennsylvania list of 41,000 tons includes 5200 tons of No. 1 heavy melting steel and 4000 tons of rails, while the Norfolk & Western will sell 16,000 tons of scrap.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	$16.50 to $17.00
No. 2 heavy melting steel	15.00 to 15.50
Scrap rails	15.50 to 16.00
Compressed sheet steel	16.50 to 17.00
Bundled sheets, sides and ends	15.00 to 15.50
Cast iron carwheels	14.00 to 14.50
Sheet bar crops, ordinary	18.00 to 18.50
Heavy breakable cast	11.50 to 12.00
No. 2 railroad wrought	15.50 to 16.00
Hvy. steel axle turnings	14.00 to 14.50
Machine shop turnings	11.00 to 11.50
Acid Open-Hearth Grades:	
Railr. knuckles and couplers	20.00 to 20.50
Railr. coil and leaf springs	20.00 to 20.50
Rolled steel wheels	20.00 to 20.50
Low phos. billet and bloom ends	20.50 to 21.00
Low phos., mill plates	20.50 to 21.00
Low phos., light grades	19.50 to 20.50
Low phos., sheet bar crops	20.50 to 21.00
Heavy steel axle turnings	14.00 to 14.50
Electric Furnace Grades:	
Low phos., punchings	18.50 to 19.00
Hvy. steel axle turnings	14.00 to 14.50
Blast Furnace Grades:	
Short shoveling steel turnings	10.50 to 11.00
Short mixed borings and turnings	10.50 to 11.00
Cast iron borings	10.50 to 11.00
Rolling Mill Grades:	
Steel car axles	19.50 to 20.50
Cupola Grades:	
No. 1 cast	14.00 to 15.00
Rails 3 ft. and under	17.50 to 18.50

Central Alloy Steel Corporation, Massillon, Ohio, has received an order through its agent, Asano Bussan Co., Ltd., for galvanized Toncan sheets for shipment to Japan, to be used in the construction of new hangars for the Tateyama Naval Air Corps.

Castings and Foundry Equipment Orders

		November, 1929	October, 1929	November, 1928
Commercial steel castings, production, net tons(a)		102,599	119,382	81,955
do.,	do., eleven months	1,236,302	....	935,308
do.,	railroad specialties	49,789	49,917	30,799
do.,	do., eleven months	538,633	....	345,080
do.,	miscellaneous	52,810	69,465	47,129
do.,	do., eleven months	697,569	....	590,228
do.,	orders, net tons(a)	88,424	134,183	84,318
do.,	do., eleven months	1,214,453	....	899,445
Malleable castings, production, net tons(a)		42,762	65,305	63,560
do.,	do., eleven months	775,048	....	720,049
do.,	orders, net tons(a)	35,985	60,954	59,664
do.,	do., eleven months	737,768	....	697,708
Foundry equipment, orders(b), index		128.6	245.3	197.6
do.,	average last three months	200.0	230.3	184.2
do.,	shipments	152.2	214.1	264.0
do.,	unfilled orders, end of month	445.4	492.5	403.9

(a)United States Department of Commerce.
(b)Foundry Equipment Manufacturers Association; index is based on monthly average of 1922-1924.

Birmingham

Pig Iron Inquiry and Sales Light—Steel Demand Recovers From the Holiday Lull

BIRMINGHAM, Jan. 7. — Sentiment in the pig iron market is improving, though first quarter demand is still light and tonnages sold are small. Shipments are gradually gaining. The tonnages being moved are largely those that had been held up since the middle of December. The base price of $15 announced in late December applies to all first quarter iron being sold in the district. Concessions of 50c. to $1 a ton are reported in competitive territories. The No. 3 furnace of the Woodward Iron Co., which was banked Dec. 22, was placed in operation again Jan. 2 on foundry iron. Of the 15 active furnaces, eight are on foundry iron, six on basic and one on recarburizing iron.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.	$14.50 to $15.00
No. 1 fdy., 2.25 to 2.75 sil.	15.00 to 15.50
Basic	14.50 to 15.00

Finished Steel.—One steel company reports a better volume of business last week than in any of the four weeks preceding. Plates, structural shapes, bars, angles and several lesser important lines have recovered from the holiday lull. New business in wire products is also showing an increase. Sheets are without improvement. Prices on galvanized sheets have been reduced $2 a ton to 3.55c. Bar prices are easier and minimum quotations are now 2.05c. Other prices are the same. Demand for fabricated structural steel is still light. The Ingalls Iron Works Co. has booked an order for 140 tons for the Fullers Earth Co. at Midway, Fla. Reinforcing bar demand continues unusually low. Nineteen open-hearths are active, the same as in the past two weeks.

Cast Iron Pipe. — The American Cast Iron Pipe Co. has booked 2000 tons for Los Angeles, and the National Cast Iron Pipe Co. will ship 500 tons for the same project. Cincinnati will open bids Jan. 7 on approximately 1500 tons, and Greenville, Ala., will open bids the next day on 4500 ft. of 6-in. pipe. Bids were opened Jan. 4 on 200 tons for Washington. Nearly all shops have resumed operations, and by another week operations will equal the pre-holiday rate, which ranged from 50 to 70 per cent. Quotations are unchanged, the base being $37 to $38 a net ton, Birmingham.

Old Material.—A few inquiries are developing, but trading has not been resumed. Prices are nominal and unchanged.

Prices per gross ton, deliv'd Birmingham dist. consumers' yards:

Heavy melting steel	$13.00 to $13.50
Scrap steel rails	14.00
Short shoveling turnings	9.00
Cast iron borings	9.00
Stove plate	11.50 to 12.00
Steel axles	22.00
Iron axles	23.00
No. 1 railroad wrought	10.00 to 10.50
Rails for rolling	15.50
No. 1 cast	13.00
Tramcar wheels	12.50
Cast iron carwheels	13.00 to 13.50
Cast iron borings, chem.	13.50 to 14.00

Youngstown

Improved Rolling Schedules, Particularly in Sheets—Finished Steel Prices Show Signs of Weakness

YOUNGSTOWN, Jan. 7.—With steel ingot production in the Valleys approaching a 50 per cent rate for the first time in several weeks, prospects for improvement in the local steel trade are beginning to materialize. However, increased production of crude steel this week is not entirely justified by the volume of current demand, and may be attributed partly to the desire of local companies to round out their raw material stocks, which had been permitted to decrease to a minimum in the last weeks of December. Tonnage releases from the automobile industry are in somewhat better volume, and new orders for steel in general continue to increase. The leading makers of automobiles in the low-price class thus far are the principal takers of steel being shipped to the automotive industry, but parts makers are now specifying more freely, and, if the other industries served by Valley mills were increasing their requirements as rapidly as the automobile, business recovery in this district would be considerably more rapid.

Railroad equipment builders served by local steel interests have heavy schedules ahead of them for this quarter, particularly the Youngstown Steel Door Co., which recently completed its new plant in the Valleys. The Truscon Steel Co., expecting a marked comeback in the building trades before the year is far advanced, is already increasing its operations, and looks for a capacity rate before the end of the quarter. Fabricators of steel plate are operating slowly just now, but are accumulating some backlog business.

Sheet mill operations are showing marked improvement this week after having been at a very low rate during the last fortnight. One large maker of automobile and furniture sheets plans a production schedule of close to 75 per cent of capacity, although sheet mills in general will range from 50 to 60 per cent. The strip industry has failed to develop such a marked improvement, and is still running on a disrupted basis, with full-week schedules the exception rather than the rule. Tin mill operations have also failed to show any notable gain, and prospects for January are none too good. Demand for steel bars is improving, but, with a large capacity for this product in the Valleys, operations have not yet been stepped up very much. Wire and nail mills are running steadily at a reduced rate, while pipe operations show no definite trend. It is too early for seasonable improvements to begin in this line, but makers are fairly well satisfied with the movement under present conditions.

Prices are very weak, and mills are doing their best to prevent a general decline of $2 a ton throughout the entire range of flat-rolled products. The local maker of tin plate has followed the lead of the Steel Corporation in reducing its price to $5.25 a base box, and, although no other formal reductions have been made, the market on automobile body sheets and blue annealed light plates and sheets is generally recognized as having declined $2 a ton. Black sheets are somewhat stronger, but the 2.75c., Pittsburgh, price is not receiving much test, and has failed to hold in a number of instances. On galvanized material, 3.40c., Pittsburgh, is practically the top of the market, although some small buyers have paid 3.50c. in recent weeks. Strip quotations are somewhat stronger, but wide strip makers are not adhering to any stabilized market price, and any large tonnage which comes out usually develops sharp price competition. Bars and plates are still quoted at 1.90c., Pittsburgh, although lower quotations on the former have appeared in the Cleveland district, and Valley mills have run into lower quotations in other territories. With steel demand certainly due for some improvement, mills are particularly anxious to avoid any open price declines at this time, as it is believed that present levels are far too low and might easily be stabilized in the second quarter if demand keeps up.

The market on primary materials is quiet, although prices are not so weak as in the finished lines. Small sales of pig iron are being made at $18.50, Valley, for basic and foundry iron, and $19 for malleable and Bessemer, but these quotations have not been tested on large tonnages. The scrap market is strong in the face of restricted mill buying, with heavy melting steel quotable at close to $16, and hydraulic compressed sheets at only slightly less. Semi-finished steel is also holding fairly well and most of the buyers in this territory are now making their commitments for the first quarter.

Two additional continuous sheet pack furnaces of the walking beam type will be installed in the plant of the Central Alloy Steel Co. at Canton by the Surface Combustion Co., Toledo, Ohio.

St. Louis

Sale of 15,000 Tons of Basic Pig Iron Starts New Year Trade—Scrap Declines

ST. LOUIS, Jan. 7.—The new year began with the purchase by an East Side melter of approximately 15,000 tons of basic pig iron from the St. Louis Gas & Coke Corporation for first quarter delivery. Sales of foundry and malleable grades are reported to be light so far, but a number of inquiries for both are pending. The outlook for steel castings is said to be excellent, and improved conditions are expected in the stove trade, which showed a decline during 1929. The pig iron market continues firm, with prices unchanged.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill.	$19.50 to $20.00
Malleable, f.o.b. Granite City	20.00
N'th'n No. 2 fdy., deliv'd St. Louis	22.16
Southern No. 2 fdy., deliv'd	18.92 to 19.42
Northern malleable, deliv'd	22.16
Northern basic, deliv'd	22.16

Freight rates: 75c. (average) Granite City to St. Louis; $2.16 from Chicago; $4.42 from Birmingham.

Finished Steel.—Operations of steel plants in the St. Louis district in 1929 were about 15 per cent higher than during 1928, according to the review by the Chamber of Commerce, which adds: "The classes of steel manufactured in this district also are increasing." It is stated that generally the prospects for rolled steel products in 1930 are good and that railroad puchasing is particularly encouraging, with the expectation that railroad orders will increase. Authorities in the building industry look for an increase of from 10 to 15 per cent in 1930.

Old Material.—A large consumer came into the market immediately after Jan. 1 and purchased a small tonnage of No. 1 heavy melting steel at 50c. under previous quotations. No. 2 heavy melting steel and miscellaneous standard-section rails are 25c. off, and No. 2 railroad wrought and railroad malleable are down 50c. The three largest consumers in the district, at whose request dealers have been withholding shipments against contracts, are now receiving such material. Railroad lists: Pennsylvania, 39,525 tons, and St. Louis-San Francisco, 40 carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

No. 1 heavy melting or shoveling steel	$12.50 to $13.00
No. 2 heavy melting or shoveling steel	11.75 to 12.25
No. 1 locomotive tires	14.50 to 15.00
Misc. stand.-sec. rails including frogs, switches and guards, cut apart	13.75 to 14.25
Railroad springs	15.50 to 16.00
Bundled sheets	9.50 to 10.00
No. 2 railroad wrought	12.50 to 13.00
No. 1 busheling	9.75 to 10.25
Cast iron borings and shoveling turnings	9.25 to 9.75
Iron rails	13.00 to 13.50
Rails for rolling	15.00 to 15.50
Machine shop turnings	6.75 to 7.25
Heavy turnings	9.50 to 10.00
Steel car axles	18.00 to 18.50
Iron car axles	25.50 to 26.00
Wrot. iron bars and trans.	21.50 to 22.00
No. 1 railroad wrought	13.00 to 13.50
Steel rails, less than 3 ft.	17.00 to 17.50
Steel angle bars	14.00 to 14.50
Cast iron carwheels	14.00 to 14.50
No. 1 machinery cast	15.25 to 15.75
Railroad malleable	14.00 to 14.50
No. 1 railroad cast	14.50 to 15.00
Stove plate	11.75 to 12.25
Relay, rails 60 lb. and under	20.50 to 23.50
Relay, rails 70 lb. and over	26.50 to 29.00
Agricult. malleable	14.00 to 14.50

Old Material.—Some brokers are paying as high as $10.30 a ton, on cars shipping point, for No. 1 heavy melting steel, but most of them will not do better than $10, and some say $9.50 is their limit. Most sales of machine shop turnings and mixed borings and turnings the past week were at $6.10 a ton, while $8.50 seems to be the most commonly quoted price on forge flashings. A slightly improved demand for steel axles has lifted the price 50c. a ton, but in contrast the market for specification pipe and forge scrap appears a little softer. There is scarcely enough buying of old materials, however, to test prices.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel	$9.50 to $10.30
Scrap T rails	9.50 to 10.00
Scrap girder rails	8.50 to 9.00
No. 1 railroad wrought	10.50 to 10.75
No. 1 yard wrought	9.50 to 10.00
Machine shop turnings	6.00 to 6.50
Cast iron borings (steel works and rolling mill)	6.00 to 6.50
Bundled skeleton, long	8.25 to 8.50
Forge flashings	8.00 to 8.50
Blast furnace borings and turnings	5.75 to 6.25
Forge scrap	8.00 to 8.50
Shafting	13.50 to 14.00
Steel car axles	16.00 to 16.50
Wrought pipe 1 in. in diameter (over 2 ft. long)	8.50 to 9.00
Rails for rolling	10.50 to 11.00
Cast iron borings, chemical	9.00 to 9.50

Prices per gross ton deliv'd consumers' yards:

Textile cast	$14.00 to $14.50
No. 1 machinery cast	15.00 to 15.25
No. 2 machinery cast	14.00 to 14.50
Stove plate	9.00 to 10.00
Railroad malleable	17.00 to 18.00

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes	3.25c.
Bars, soft steel or iron	3.15c.
Cold-fin. rounds, shafting, screw stock	3.75c.
Black sheets (No. 24)	4.25c.
Galv. sheets (No. 24)	5.10c.
Blue ann'l'd sheets (No. 10)	3.45c.
Black corrug. sheets (No. 24)	4.30c.
Galv. corrug. sheets	5.15c.
Structural rivets	4.15c.
Boiler rivets	4.15c.

	Per Cent Off List
Tank rivets, 7/8-in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	60
Carriage bolts	60
Lag screws	60
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50

Boston

Cast Iron Pipe Prices About $1 a Ton Lower

BOSTON, Jan. 7.—Because consumers have been busy with inventories, business in pig iron was rather inactive the past week, sales totaling not more than 2000 tons. Buffalo furnaces apparently are holding No. 2 plain and No. 2X iron at $17 a ton, furnace, and furnaces east of Buffalo have not found it necessary to go below the equivalent to secure business. A real test of prices may come during the next week when the General Electric Co. will probably close on 1000 tons for New England plants, a textile machinery maker on 1000 tons of No. 2 plain and 1000 tons of No. 2X or possibly larger tonnages, and two or three smaller consumers on lots of less than 500 tons each. Several other buyers have signified their intention of awaiting the outcome of these transactions before placing orders for first quarter delivery.

Foundry iron prices per gross ton deliv'd to most New England points:

*Buffalo, sil. 1.75 to 2.25	$21.91 to $22.41
*Buffalo, sil. 2.25 to 2.75	21.91 to 22.41
East. Penn., sil. 1.75 to 2.25	22.65 to 23.15
East. Penn., sil. 2.25 to 2.75	23.15 to 23.65
Va., sil. 1.75 to 2.25	25.21
Va., sil. 2.25 to 2.75	25.71
*Ala., sil. 1.75 to 2.25	24.11
*Ala., sil. 2.25 to 2.75	24.61
†Ala., sil. 1.75 to 2.25	20.25
†Ala., sil. 2.25 to 2.75	20.75

Freight rates: $4.91 all rail from Buffalo; $3.65 all rail from eastern Pennsylvania; $5.21 all rail from Virginia; $9.61 all rail from Alabama and $5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

Cast Iron Pipe.—With prices on domestic cast iron pipe fully $1 a ton lower than heretofore, municipalities show slightly more interest. Pawtucket, R. I., has placed 1250 tons of 6 to 24-in. pipe with the Warren Foundry & Pipe Co.; Manchester, N. H., 500 tons of 6 to 16-in. with R. D. Wood & Co.; and New Bedford, Mass., 125 tons of 6 to 12-in., and Attleboro, Mass., 100 tons of 6-in. with the United States Pipe & Foundry Co. Brockton, Mass., will soon be in the market for 12 miles of 24-in. pipe, while Southboro, Mass., probably will ask bids on a tonnage for a new water system. Prices quoted openly on do-

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.365c.
Structural shapes—	
Angles and beams	3.365c.
Tees	3.365c.
Zees	3.465c.
Soft steel bars, small shapes	3.265c.
Flats, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats	7.10c.
Spring steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tie steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex.	*3.55c. to 5.55c.
Squares and flats	*4.05c. to 7.05c.
Toe calk steel	6.00c.
Rivets, structural or boiler	4.50c.

	Per Cent Off List
Machine bolts	50 and 5
Carriage bolts	50 and 5
Lag screws	50 and 5
Hot-pressed nuts	50 and 5
Cold-punched nuts	50 and 5
Stove bolts	70 and 10

*Including quantity differentials.

mestic pipe are: 4-in., $43.10 to $44.10 a ton, delivered common Boston freight rate points; 6 to 16-in., $39.10 to $40.10; 20-in. and larger, $38.10 to $39.10. A $4 differential is asked on Class A and gas pipe. The Boston Consolidated Gas Co. has temporarily withdrawn its inquiry for upward of 1000 tons of gas pipe.

Canada

Pig Iron Consumers 60 Per Cent Covered

TORONTO, ONT., Jan. 7.—Local blast furnace representatives look for a speeding up in pig iron commitments for spot and future delivery. Several first quarter contracts were placed during the week. Upward of 60 per cent of those who place contracts for merchant iron are now covered to the end of March. Others are coming forward, and it is expected that forward business will be pretty well cleared up by the middle of the month.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	$23.60
No. 2 fdy., sil. 1.75 to 2.25	23.10
Malleable	23.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	$25.00
No. 2 fdy., sil. 1.75 to 2.25	24.50
Malleable	25.00
Basic	23.50
Imported Iron, Montreal Warehouse	
Summerlee	$33.50
Carron	33.00

Old Material.—The demand for iron and steel scrap in the Toronto and Montreal markets has been small during the past two weeks. Melters are inquiring for supplies, but are not yet placing orders.

Dealers' buying prices:

	Per Gross Ton	
	Toronto	Montreal
Heavy melting steel	$10.00	$8.50
Rails, scrap	11.00	9.00
No. 1 wrought	10.00	12.00
Machine shop turnings	7.50	5.00
Boiler plate	7.50	6.00
Heavy axle turnings	8.00	7.50
Cast borings	7.50	5.00
Steel borings	7.50	6.50
Wrought pipe	6.00	6.00
Steel axles	15.00	20.00
Axles, wrought iron	17.00	22.00
No. 1 machinery cast	....	17.00
Stove plate	....	13.00
Standard carwheels	....	16.00
Malleable	....	13.00
Per Net Ton		
No. 1 mach'ry cast	$16.00	....
Stove plate	12.00	....
Standard carwheels	15.00	....
Malleable scrap	14.00	....

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes	3.40c.
Bars, soft steel or iron	3.30c.
New billet reinforc. bars	3.15c.
Rail steel reinforc. bars	3.00c.
Hoops	4.05c.
Bands	3.50c.
Cold-fin. rounds and hex	3.85c.
Squares	4.35c.
Black sheets (No. 24)	4.05c.
Galvanized sheets (No. 24)	4.90c.
Blue ann'l'd sheets (No. 10)	3.45c.
Structural rivets	3.85c.
Small rivets	65 per cent off list
No. 9 ann'l'd wire, per 100 lb.	$3.00
Com. wire nails, base per keg	2.85
Cement c't'd nails, base 100 lb. keg	2.85
Chain, per 100 lb.	8.75
	Net per 100 Ft.
Lap-welded steel boiler tubes, 2-in.	$16.50
4-in.	34.50
Seamless steel boiler tubes, 2-in.	17.50
4-in.	36.00

Cincinnati

Pig Iron Sales, at 5300 Tons, Largest in Weeks—Gain in Steel Demand Strengthens Scrap Market

CINCINNATI, Jan. 7.—With stocks of pig iron depleted, district consumers entered the market last week for a total of about 5300 tons to cover first quarter needs. This is more business than has been done in any recent week. The week's purchases included 3200 tons of Southern iron at prices which range from $14 to $15, base Birmingham. A large portion of the Southern iron, however, brought $14.50, Birmingham, which is the generally accepted quotation in this area, although concessions to about $14 are likely on large tonnages. About 500 tons of the week's business was silvery iron, in lots ranging from 250 tons down to single cars, most of which is to be shipped into Michigan. A central Ohio melter took 500 tons of Southern foundry iron, an eastern Ohio consumer bought 400 tons, and a Cincinnati buyer ordered 1000 tons. An order for 500 tons of Northern foundry iron from a central Indiana consumer completed the list of sizable orders. Inquiries have been received from a central Indiana buyer for 500 tons of Northern foundry iron and from a central Ohio consumer for 2000 tons. The Lima Locomotive Works, Lima, Ohio, is in the market for 1000 tons of iron.

Prices per gross ton, deliv'd Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25	$19.89 to $20.39
Ala. fdy., sil. 1.75 to 2.25	17.69 to 18.19
Ala. fdy., sil. 2.25 to 2.75	18.19 to 18.69
Tenn. fdy., sil. 1.75 to 2.25	17.69 to 18.19
S'th'n Ohio silvery, 8 per cent	26.89

Freight rates, $1.89 from Ironton and Jackson, Ohio; $3.69 from Birmingham.

Finished Material.—With the opening of the first quarter, district buyers of sheets are displaying increased interest in covering their needs. Demand for various grades of sheets was ahead of production last week for the first time since the third quarter of last year.

Coke.—Demand for by-product foundry coke has followed the increase in pig iron sales. Specifications against current contracts have been increased about 27 per cent over last month's tonnage. Prices continue steady at about $10.05, delivered Cincinnati.

Old Material.—With district mills feeling the effect of a better demand for finished materials, the scrap market is more active than it has been in the past 30 days. Shipments on contracts have increased since the first of the year and some new business, although not large, has been closed. Prices on heavy melting steel, No. 2 wrought and cast iron borings have advanced 25c., with dealers bidding near the top of the spread. The supply of good scrap is still low, but higher quotations are expected to attract more material to the market.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel	$12.00 to $12.50
Scrap rails for melting	13.00 to 13.50
Loose sheet clippings	8.00 to 8.50
Bundled sheets	10.75 to 11.25
Cast iron borings	8.25 to 8.75
Machine shop turnings	8.00 to 8.50
No. 1 busheling	10.00 to 10.50
No. 2 busheling	6.50 to 7.00
Rails for rolling	13.50 to 14.00
No. 1 locomotive tires	14.25 to 14.75
No. 2 railroad wrought	12.00 to 12.50
Short rails	17.50 to 18.00
Cast iron carwheels	12.00 to 12.50
No. 1 machinery cast	18.50 to 19.00
No. 1 railroad cast	15.00 to 15.50
Burnt cast	10.00 to 10.50
Stove plate	10.00 to 10.50
Brake shoes	10.00 to 10.50
Agricultural malleable	14.00 to 14.50
Railroad malleable	15.00 to 15.50

Buffalo

Steel Mills Increase Operations Slightly

BUFFALO, Jan. 6.—The pig iron market has a better tone. A little more inquiry is coming out. One foundry inquiry from New England is for 1000 to 5000 tons, and there is miscellaneous inquiry ranging from 1000 to 1500 tons. Producers believe that a buying movement will develop within a week or 10 days. Most of the furnaces report considerable booking of small lots during the past week. On sales for shipment to Eastern points, $17, furnace, seems to be holding. The district price is steady at $19.50, base.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25	$19.50
No. 2X fdy., sil. 2.25 to 2.75	20.00
No. 1 fdy., sil. 2.75 to 3.25	21.00
Malleable, sil. up to 2.25	20.00
Basic	$17.00 to 18.00
Lake Superior charcoal	27.28

Finished Steel.—Operations of Buffalo open-hearths and mills have slightly improved. Additional capacity has been put on at the Lackawanna plant of the Bethlehem Steel Co., 19 open-hearths now being active at that plant. The Donner Steel Co. has resumed operation of three open-hearths, which may be increased to five in a few days.

Old Material.—While there are no indications of an immediate buying movement, relief for the dealers has been afforded by the lifting of suspensions by some of the local consuming plants. In addition to releases on

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes	3.40c.
Soft steel bars	3.30c.
Reinforcing bars	2.95c.
Cold-fin. flats, sq. and hex	4.45c.
Rounds	3.95c.
Cold-rolled strip steel	5.85c.
Black sheets (No. 24)	4.20c.
Galv. sheets (No. 24)	4.85c.
Blue ann'l'd sheets (No. 10)	3.50c.
Com. wire nails, base per keg	$3.60
Black wire, base per 100 lb	3.75

No. 1 heavy melting steel, suspensions have been removed on stove plate and No. 1 machinery cast scrap. There is a shortage of machine shop turnings, shoveling turnings and cast iron borings. A few small sales of shoveling turnings are reported at $12.50.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel.	$14.00
No. 2 heavy melting scrap.	12.50
Scrap rails	$13.00 to 14.00
Hydraul. comp. sheets	12.50
Hand bundled sheets	10.50 to 11.00
Drop forge flashings	12.50
No. 1 busheling	12.50
Hvy. steel axle turnings	12.50 to 13.00
Machine shop turnings	8.00 to 8.50
No. 1 railroad wrought	10.50 to 11.00
Acid Open-Hearth Grades:	
Knuckles and couplers	17.00 to 17.50
Coil and leaf springs	17.00 to 17.50
Rolled steel wheels	17.00 to 17.50
Low phos. billet and bloom ends	18.00 to 18.50
Electric Furnace Grades:	
Short shov. steel turnings.	12.00 to 12.50
Blast Furnace Grades:	
Short mixed borings and turnings	10.75 to 11.25
Cast iron borings	10.75 to 11.25
No. 2 busheling	8.00
Rolling Mill Grades:	
Steel car axles	16.50 to 17.00
Iron axles	20.00 to 21.00
Cupola Grades:	
No. 1 machinery cast	14.50 to 15.00
Stove plate	12.15
Locomotive grate bars	10.00 to 10.50
Steel rails, 3 ft. and under	17.75 to 18.00
Cast iron carwheels	11.50 to 12.00
Malleable Grades:	
Industrial	16.50 to 17.00
Railroad	16.50 to 17.00
Agricultural	16.50 to 17.00
Special Grades:	
Chemical borings	12.00 to 12.50

Detroit Scrap Market Tone Is Stronger

DETROIT, Jan. 7.—Increase in releases rather than new buying has served to maintain the strong tone of the market on old material in this district.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel	$12.50 to $13.00
Borings and short turnings	9.25 to 9.75
Long turnings	8.50 to 9.00
No. 1 machinery cast	12.50 to 13.00
Automotive cast	11.50 to 12.00
Hydraul. comp. sheets	12.50 to 13.00
Stove plate	9.00 to 9.50
New No. 1 busheling	11.50 to 12.00
Old No. 1 busheling	9.25
Sheet clippings	8.00 to 8.50
Flashings	10.75 to 11.25

Russia Buys German Ships

HAMBURG, GERMANY, Dec. 23.—Russia has ordered 14 trawlers at a cost of $4,000,000 from the Schichau Werke in Elbing and is negotiating with the same company for six or eight fishing steamers for use in the Kamchatka fisheries.

Illinois Steel Co. has announced its intention of abandoning its Bay View mills in Milwaukee, which have not been in operation except in the production of small rails and other minor products during recent years. Much of the equipment is antiquated, and the company had given the city of Milwaukee an option to purchase the site.

Uniform Trade Customs Proposed for Foundries

With a view of securing the formation and adoption of a uniform set of trade customs and sales agreements that would apply to the entire foundry industry, a comparison of foundry trade customs and sales agreements recently was made by the board of administration, the Ohio Foundries Association, Inc., Cleveland, and copies were sent to every foundry trade association in the country, together with a questionnaire asking for an expression of opinion on the adoption of uniform trade customs. Replies indicate that it is the consensus of opinion that uniform trade customs would be a benefit to the entire industry.

The board of administration of the Ohio association decided some time ago to inaugurate this movement. It felt that its members, including foundries making all kinds of castings, needed a set of uniform trade customs.

The comparison prepared covers the trade customs of the Gray Iron Institute, Cleveland; the Malleable Iron Research Institute, Cleveland; Steel Foundries Society of America, New York; Connecticut Foundrymen's Association, Meriden, Conn.; New England Foundrymen's Association, Cambridgeport, Mass., and the Ohio Foundries Association. The comparison indicates that there is very little difference in the various trade customs now used by the foundry associations and that it would not be a difficult matter to set up a uniform set of trade customs. It is planned to hold a conference on this subject. The advice and comments of all trade association executives will be asked, and it is expected that something will be accomplished toward the adoption of a set of uniform customs. The National Association of Purchasing Agents has reported favorably on the plan, and its iron and steel committee now has the matter under discussion. It is hoped that the benefit of the viewpoint of this committee will be secured in formulating uniform trade customs.

New High Record in Imports of Iron Ore

Incoming shipments of iron ore in 1929 have made a new high record, with an estimated total of 3,120,000 gross tons. Figures for the first 11 months are given by the United States Department of Commerce as 2,853,279 tons. This is a higher total than was ever before imported in the 12 months of any calendar year. The previous record, made in 1923, was 2,768,430 tons.

Preceding 1929 only nine years had passed the 2,000,000-ton mark, three of these being 1910, 1912 and 1913, while the others are 1923 to 1928 inclusive. Previous to 1923 the record was held by 1913, with 2,594,770 tons.

As shown in the table, the November imports were 268,876 tons. This represents an increase of 20 per cent over the incoming shipments in November, 1928, but is slightly lower than the 270,279 tons brought in during October. While the November imports were only the sixth largest for the elapsed portion of the year, they represented a larger tonnage than came in during any month of 1928 and were exceeded only twice in 1927 and once in 1926.

Chile continues to supply the lion's share of the tonnage imported. For November almost 60 per cent of the total came from Chile and nearly 22 per cent from Cuba. For the 11 months Chile furnished 53 per cent of the total and Cuba nearly 21 per cent. Features of the 1929 import movement, differentiating it from that of the preceding year, are the elevenfold increase in tonnage coming from Sweden, following the collapse of the strike of the preceding year; a reduction of almost two-thirds in shipments from French Africa and a reduction of more than 92 per cent in imports from Canada. All of these are shown in the table.

McClintic-Marshall Co. and Riter-Conley Merge

The McClintic-Marshall Co. and the Riter-Conley Co., which have been conducted separately, though owned by the same interests, were merged into one company as of Jan. 1. The Riter-Conley Co. will be known as the Riter-Conley works of the McClintic-Marshall Co. The business will be under the same management as the McClintic-Marshall Co., and both will have their general offices in the Oliver Building, Pittsburgh.

SOURCES OF AMERICAN IMPORTS OF IRON ORE
(In Gross Tons)

	November		11 Months Ended November	
	1929	1928	1929	1928
Chile	160,792	150,800	1,512,628	1,320,900
Cuba	58,000	44,000	590,350	321,286
Spain	.....	7,400	48,885	37,165
Sweden	13,554	6,944	288,298	26,558
French Africa	8,750	14,000	150,545	417,630
Canada	40	.....	3,483	45,359
Other countries	27,740	.....	259,090	111,349
Total	268,876	233,144	2,853,279	2,280,247

Fabricated Structural Steel

About 21,000 Tons Added to Pending Work But Awards, at 7000 Tons, Are Extremely Light

INFLUENCED no doubt by the interruption in activities caused by the holiday season, structural steel awards of the past week, at 7000 tons, were unusually light. The records would have to be searched for a long period to find a week in which this class of contracting has been at such low ebb. In new work, the total is more impressive. About 21,000 tons was added to pending projects. This includes 7000 tons for a telephone exchange building to be built in Brooklyn and 5000 tons for a high school building in Chicago. Awards follow:

BERGEN COUNTY, N. J., 600 tons, bridge over Passaic River, to Paterson Bridge Co.

STATE OF NEW YORK, 500 tons, two highway bridges, to American Bridge Co.

NEW YORK, 150 tons, highway bridge in Bronx for Park Commission, to Penn Bridge Co.

NEW YORK, 200 tons, clubhouse for Independent Sons of Israel, West Ninety-third Street, to Levering & Garrigues Co.

PHILADELPHIA, 800 tons, warehouse for Morris Wheeler & Co., to Shoemaker Bridge Co.

CHESTER, PA., 365 tons, building for Bell Telephone Co., to McClintic-Marshall Co.

BALTIMORE, 1200 tons, building for Johns Hopkins Hospital, to American Bridge Co.

BALTIMORE, 525 tons, Broening Highway underpass, to Shoemaker Bridge Co.

MIDWAY, FLA., 140 tons, Fullers Earth Co., to Ingalls Iron Works.

CHICAGO, 100 tons, A. G. O'Leary Co., to Gage Structural Steel Co.

CHICAGO, 550 tons, Dallas Brass & Copper Co., to Hansell-Elcock Co.

MILWAUKEE, 500 tons, coal bridge for Northwestern Fuel Co., to Milwaukee Bridge Co.

ST. LOUIS, 275 tons, garage for Union Electric Co., to Mississippi Valley Structural Steel Co.

HOT SPRINGS, ARK., 600 tons, taintor gates for Arkansas Light & Power Co., to Virginia Bridge & Iron Co.

OGDEN, UTAH, 140 tons, enameling room addition for American Can Co., to Virginia Bridge & Iron Co.

LA MESA, CAL., 140 tons, plates, pipe line for La Mesa, Lemon Grove & Spring Valley Irrigation District, to an unnamed bidder.

RIVERSIDE, CAL., 136 tons, grandstand, to an unnamed bidder.

VANCOUVER, B. C., 400 tons, pier extension for Canadian National Railways, to an unnamed company.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

STATE OF MAINE, 250 tons, two highway bridges.

BOSTON & MAINE RAILROAD, 250 tons, bridge at Johnsonville, N. Y.

BERGEN COUNTY, N. J., 1800 tons, highway bridge over Hackensack River.

NEW YORK, 2000 tons, hangars and shops at Floyd Bennett Field, Barren Island.

NEW YORK, 600 tons, apartment building on West Seventy-fifth Street.

BROOKLYN, 7000 tons, Willoughby Avenue telephone exchange building.

JERSEY CITY, N. J., 300 tons, Summit Avenue telephone exchange building.

PENNSYLVANIA RAILROAD, 155 tons, bridge at Evansville, N. J., Fort Pitt Bridge & Iron Co. low bidder.

NEW ROCHELLE, N. Y., unstated tonnage, elementary school on Hardscrabble Road.

SCHENECTADY, N. Y., 200 tons, Mount Pleasant high school, former bids rejected.

WASHINGTON, unstated tonnage, Administration Building.

NICKEL PLATE RAILROAD, 230 tons, bridge at Cofeen, Ill.

CHICAGO, 150 tons, building for United Autographic Register Co.

CHICAGO, 3300 tons, Phillips High School; bids to be taken again soon.

CHICAGO, 5000 tons, Lane Technical High School; plans being considered for rebuilding.

Railroad Equipment

Seaboard Air Line In the Market for 1000 Cars

ABOUT 140,000 tons of steel will be required for the 11,500 freight cars to be bought by the Chesapeake & Ohio, Pere Marquette and Hocking Valley railroads. Bids on the cars close Jan. 27. The 130 locomotives also being inquired for will take about 7000 tons of plates. Equipment buying of the past week was confined to 500 automobile cars ordered by the Burlington. The Seaboard Air Line is inquiring for 1000 box cars. Details follow:

Seaboard Air Line has issued an inquiry for 1000 composite box cars.

Burlington has ordered 500 automobile cars from Pressed Steel Car Co.

Bangor & Aroostook is in the market for 200 underframes and superstructures for box cars.

Bids have been asked for by Jan. 27 on the 11,500 freight cars being inquired for by the Chesapeake & Ohio, Pere Marquette and Hocking Valley railroads.

Chicago Great Western has ordered 15 locomotives from Lima Locomotive Works.

Canadian National Railways has placed an order with National Steel Car Co., Hamilton, Ont., for 20 baggage and 15 refrigerator cars.

Bessemer & Lake Erie Railroad has awarded nine large freight locomotives to Baldwin Locomotive Works.

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The Polish State Railways are to have American assistance in securing 14,000 freight cars and 10,000 passenger cars over the next seven years, according to Charles S. Dewey, financial adviser to the Polish Government, who made the announcement at a luncheon on Dec. 8 in Warsaw of the Polish-American Chamber of Commerce. The Standard Steel Car Corporation, it appears, bought a block of stock of Lilpop, Rau & Loewenstein and extended a credit of $1,000,000 for increasing the production of that concern. The arrangement calls for 10-yr. credit and financing by the Standard Car Finance Corporation of America.

Reinforcing Steel Awards

NEW YORK, 700 tons, route 107, section 10, Brooklyn subway, to McClintic-Marshall Co.

CINCINNATI, 1600 tons, Starret Building Co., to Jones & Laughlin Steel Corporation.

CHICAGO, 450 tons, Wabash Avenue bridge, to Kalman Steel Co.

PHILADELPHIA, 500 tons, bulkhead and sewer on Schuylkill River, to Taylor-Davis Co.

PHILADELPHIA, 100 tons, bridge at Wyoming Avenue and Boulevard, to Taylor-Davis Co.

LOS ANGELES, 104 tons, for city, to Los Angeles Iron & Steel Co.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

CLEVELAND, 300 tons, Fairmount Creamery.

Business Recovery in Sight Say Statisticians

Business activity during November showed hesitation in basic industries throughout the country, but to far less a degree than might reasonably have been expected for the month following the stock market collapse, and various strong factors in the present situation seem to indicate an early recovery. That, in brief, is the consensus of the Conference of Statisticians in Industry, operating under the auspices of the National Industrial Conference Board, New York.

Retail trade during November has been holding up well; department store sales in November were about the same in volume as in the same month a year ago, increased sales in Southern and Western cities offsetting decreases in other sections.

Automobile production was sharply reduced during November, total production for that month being 16.5 per cent less than during the corresponding month a year ago. New registrations of cars for the first 10 months of the year, however, were more than for the entire year 1928.

Employment in the metal trades declined by about 6 per cent during the month, according to the National Metal Trades Association index, based on reports from plants in 26 cities.

Newspaper advertising during November was about the same in volume as for the same month a year ago, but the total for the first 11 months of the year exceeded that for the same period of the previous year by 4 per cent. Periodical advertising increased by 8 per cent, and advertising budgets for 1930 are reported in excess of those of the current year.

OBITUARY

WILFRED LEWIS, formerly president, Tabor Mfg. Co., Philadelphia, died of apoplexy, Dec. 19, at sea, off Egypt, while on a world cruise. He was born in Philadelphia in 1854, and was graduated from the Massachusetts Institute of Technology in 1875. In 1879 he joined William Sellers & Co., Philadelphia, and was successively mechanic, draftsman, designer and assistant engineer and director of the company, which he left to become president of the Tabor Mfg. Co.

WILFRED LEWIS

in 1900. He retired in 1928. He was an authority on gears and his contributions to the design and construction of gear teeth resulted in his receiving the American Society of Mechanical Engineers' award in 1927. During the war he served in an advisory capacity in Washington and helped in the development of armored tanks. In 1927 he was the recipient of the Longstreth Medal of the Franklin Institute for perfecting molding machines.

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WILLIAM D. GRANT, manager, Christiana Machine Co., Christiana, Pa., died Dec. 19, at Coatesville Hospital as a result of injuries sustained in an automobile accident.

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JOSEPH SCHONTHAL, president, Joseph Schonthal Co., Columbus, Ohio, died Dec. 15.

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ALBERT SENIOR, head of George Senior & Sons, Ltd., Sheffield, England, operators of Pond's Forge in that city, died on Dec. 29. He was associated with the steel industry of Sheffield all his life, succeeding his father, GEORGE SENIOR.

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MAXIMILIAN MANNABERG, closely associated with the Frodingham Iron & Steel Co., Ltd., Scunthorpe, Lincolnshire, England, and a director of the company, has died, at the age of 72 years.

ARTHUR J. LARMON, president, Rahn-Larmon Co., manufacturer of machine tools, Cincinnati, died Dec. 25, aged 44 years. Mr. Larmon, who lived in Cincinnati all his life, had been engaged in the machine-tool business for 25 years, having entered the employ of the Rahn-Larmon Co. as a clerk upon his graduation from Kenyon College. He was elected president of the company nine years ago. Mr. Larmon was the son of JAMES A. LARMON, pioneer in barbed wire fence manufacture in Cincinnati.

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CHARLES B. HALL, chemical sales manager of the Cleveland-Cliffs Iron Co., Cleveland, died Dec. 22, aged 60 years. He had been connected with the company 13 years and previously was manager of the Lennox Chemical Co., Cleveland.

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ASAEL E. ADAMS, president of the First National Bank of Youngstown, and a director and member of the executive committee of the Youngstown Sheet & Tube Co., died at his home in the Ohio city on Jan. 3, aged 63 years. He had been prominently identified with the industrial and financial life of the Youngstown district for more than 30 years, and was also a director of the Youngstown Steel Car Co., the Youngstown Foundry & Machine Co., and many other concerns in the metal-working and other industries.

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WILLIAM H. REID, secretary and treasurer from 1904 to 1923 for Marshall & Huschart Machinery Co., Chicago, dealer in machine tools, died Dec. 23, aged 63 years.

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BENJAMIN SPRAGUE STORY, for several years connected with Pickands, Mather & Co., Cleveland, and recently with the Cleveland office of Butler Brothers, ore dealers, died Jan. 4 of pnuemonia, aged 36 years. He was a graduate of University School, Cleveland, and of Sheffield Scientific School of Yale University, active in the affairs of the University Club, Cleveland, and prominent among the younger business men of that city.

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ARCHER A. LANDON, formerly vice-president of the American Radiator Co., died in Buffalo, Jan. 5, aged 61 years. He was an advisor to President Wilson on labor conditions during the War. He also served as a dollar-a-year man on the Aircraft Board.

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HENRY H. BRIGHAM, president, North American Car Corporation, Chicago, died Jan. 4, while on a visit to New York. He was born in 1868 at Sharon, Wis., and began his business career as a telegraph operator for the Chicago & North Western. In 1908 he organized the car corporation.

Increased Residential and Road Building Expected

An increased volume of residential and highway construction and increased farm building in 1930 are expected to more than offset moderate declines anticipated in commercial and public building, according to a survey made by the Universal Portland Cement Co., Chicago, among building material dealers located in all sections of the Middle West. More than 1100 dealers contributed opinions based on close observation of their own local conditions.

Five dealers out of every six expressing views as to the effects of the recent stock market decline on construction in their localities state that it will exert either a favorable influence or no influence at all.

Total construction in 1930 is expected by dealers to exceed 1929 volume in western New York, eastern Pennsylvania, West Virginia, eastern Ohio, northern Illinois, Wisconsin, Kentucky, southern Minnesota and Iowa.

Total construction in 1930 will about equal 1929 volume in western Pennsylvania, western Ohio, Indiana, southern Illinois, northern Michigan, northern Minnesota and South Dakota.

Some decline in total volume is anticipated in central Illinois, southern Michigan and North Dakota.

Large Sand-Blast and Dust Collecting System

Shake-out and sand reclaiming for large castings and the method of cleaning them have been problems at the Eddystone, Pa., division of the General Steel Castings Corporation. The largest castings are locomotive frames 65 ft. long with cylinders cast integral.

After considerable investigation the sand-blast process was selected as the method of cleaning.

The sand-blast installation involved the design of a single unit which would provide for cleaning the large locomotive frames, as well as a great volume of smaller work. This will be accomplished in a special sand-blast room 70 ft. long by 15 ft. high, which accommodates the 65-ft. castings on a train of coupled cars. This room can readily be divided into three separate compartments with the cars, uncoupled, handling work in each compartment.

This room is provided with ventilation to give best working conditions, either operating as a single room or as individual units, with dust collecting equipment located just outside the building. The entire unit, together with the ventilating and dust collecting system for the shake-out and the sand reclaiming system, are being built by Pangborn Corporation, Hagerstown, Md. Installation of the sand-blast and dust collecting systems is scheduled for completion in May.

Non-Ferrous Metal Markets

Copper More Active—Better Demand for Tin—Lead Demand Good—Zinc Weak

NEW YORK, Jan. 7.

Copper.—As was predicted by sellers a week ago, buying of copper, particularly by domestic consumers, has become decidedly active as the month opens. Besides fairly large tonnages taken in the last few days by the General Electric Co. and the Western Electric Co., sales of several million pounds have been made to other consumers. Some of the demand is for January shipment, indicating low stocks. Part of the sales extend into April. Buying by foreign consumers, however, has not increased over the pace set the latter part of December. Sales for January shipment have not exceeded 5000 tons thus far, and it is expected that at least 35,000 to 40,000 tons must yet be bought. The price situation is very firm. Having weathered conditions in December which might have caused a lower quotation, the feeling is general that the price will hold for some time at 18c., delivered in the Connecticut Valley, for electrolytic copper. There is, of course, no change in the price of Copper Exporters, Inc., which stands at 18.30c., c.i.f. usual European ports. Lake copper is more active at 18c. to 18.12½c., delivered.

Copper Averages.—The average price of Lake copper for December, based on daily quotations in THE IRON AGE, was 18.12½c., delivered New York. The average price of electrolytic copper was 17.75c., refinery, or 18c., delivered in the Connecticut Valley.

Tin.—For the first time in several weeks, business in tin has been fairly large. Sales of spot Straits tin thus far this year have been about 1000 tons, the transactions having been consummated principally on Jan. 3 and Jan. 6. Both dealers and consumers were the buyers and spot delivery was principally involved. The London market has been drifting downward, and prices today were lower than early this month, but about £1 per ton higher than our last report. Spot standard today was quoted at £176 2s. 6d., future standard at £179 5s. and spot Straits at £178 2s. 6d. The Singapore price today was £187 7s. 6d. A feature of the London market is the large increase in stocks of spot standard. The market here today was fairly active at 39.62½c., New York,

THE WEEK'S PRICES, CENTS PER POUND FOR EARLY DELIVERY

	Jan. 7	Jan. 6	Jan. 4	Jan. 3	Jan. 2	Dec. 31
Lake copper, New York	18.12½	18.12½	18.12½	18.12½	18.12½	18.12½
Electrolytic copper, N. Y.*	17.75	17.75	17.75	17.75	17.75	17.75
Straits tin, spot, N. Y.	39.62½	38.62½	....	38.87½	39.75	39.75
Zinc, East St. Louis	5.30	5.40	5.45	5.45	5.45	5.45
Zinc, New York	5.65	5.75	5.80	5.80	5.80	5.80
Lead, St. Louis	6.10	6.10	6.10	6.10	6.10	6.10
Lead, New York	6.25	6.25	6.25	6.25	6.25	6.25

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

Rolled Products

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—
- High brass ..... 23.25c.
- Copper, hot rolled ..... 26.75c.
- Zinc ..... 10.50c.
- Lead (full sheets) ..... 10.00c.

Seamless Tubes—
- High brass ..... 28.25c.
- Copper ..... 29.25c.

Rods—
- High brass ..... 21.25c.
- Naval brass ..... 24.00c.

Wire—
- Copper ..... 19.87½c.
- High brass ..... 23.75c.

Copper in Rolls ..... 26.75c.
Brazed Brass Tubing ..... 30.87½c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of Mississippi River and also to St. Louis on shipments to points west of that river.

- Sheets, 0 to 10 gage, 3 to 30 in. wide ..... 33.00c.
- Tubes, base ..... 42.00c.
- Machine rods ..... 34.00c.

Chicago Warehouse

(Prices Cover Trucking to Customers' Doors in City Limits)

	Base per Lb.
Sheets—	
High brass	23.25c.
Copper, hot rolled	27.75c.
Copper, cold rolled, 14 oz. and heavier	30.00c.
Zinc	10.75c.
Lead, wide	10.30c.
Seamless Tubes—	
Brass	28.25c.
Copper	29.25c.
Brass Rods	21.25c.
Brazed Brass Tubes	31.00c.

New York or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass	21.12½c.	to 22.12½c.
Copper, hot rolled, base sizes	27.75c.	to 28.75c.
Copper, cold rolled, 14 oz. and heavier, base sizes	30.00c.	to 31.00c.
Seamless Tubes—		
Brass	26.00c.	to 27.00c.
Copper	29.12½c.	to 30.12½c.
Brass Rods	18.87½c.	to 19.87½c.
Brazed Brass Tubes	29.12½c.	to 30.12½c.

New York Warehouse

Delivered Prices, Base per Lb.

- *Zinc sheets (No. 9), casks* ..... 10.75c. to 11.25c.
- *Zinc sheets, open* ..... 11.50c. to 12.00c.

Metals from New York Warehouse

Delivered Prices, Per Lb.

Tin, Straits pig	41.00c. to 42.00c.
Tin, bar	43.00c. to 44.00c.
Copper, Lake	19.50c.
Copper, electrolytic	19.25c.
Copper, casting	19.00c.
Zinc, slab	6.75c. to 7.25c.
Lead, American pig	7.00c. to 7.50c.
Lead, bar	9.00c. to 9.50c.
Antimony, Asiatic	10.50c. to 11.00c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure)	25.00c. to 26.00c.
Alum. ingots, No. 12 alloy	24.00c. to 25.00c.
Babbitt metal, commercial grade	25.00c. to 35.00c.
Solder, ½ and ½	27.25c. to 28.25c.

Metals from Cleveland Warehouse

Delivered Prices, Per Lb.

Tin, Straits pig	44.50c.
Tin, bar	46.50c.
Copper, Lake	19.50c.
Copper, electrolytic	19.25c.
Copper, casting	18.75c.
Zinc, slab	8.00c. to 8.25c.
Lead, American pig	7.00c. to 7.20c.
Lead, bar	9.25c.
Antimony, Asiatic	16.00c.
Babbitt metal, medium grade	18.00c.
Babbitt metal, high grade	47.00c.
Solder, ½ and ½	28.50c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses.

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	14.75c.	16.25c.
Copper, hvy. and wire	14.50c.	16.00c.
Copper, light and bottoms	12.50c.	13.75c.
Brass, heavy	8.00c.	9.00c.
Brass, light	6.75c.	7.75c.
Hvy. machine composition	11.00c.	12.00c.
No. 1 yel. brass turnings	9.00c.	9.50c.
No. 1 red brass or compos. turnings	10.50c.	11.75c.
Lead, heavy	4.75c.	5.25c.
Lead, tea	3.75c.	4.25c.
Zinc	3.25c.	3.75c.
Sheet aluminum	11.00c.	13.00c.
Cast aluminum	10.00c.	12.00c.

about 250 tons changing hands for all positions.

Lead.—The activity of late December has continued into the new year, and orders have been more numerous than during that period. Demand has been about equally distributed over January and February and consumption has been divided among practically all the leading avenues, with cable makers responsible for a large part of the new business. Prices are firm and unchanged at 6.10c., St. Louis, and the price of the leading interest is still 6.25c., New York.

Zinc.—Statistics for December indicate an increase in stocks of refined zinc of approximately 14,000 tons, probably the largest increase in many months. This has weakened confidence and, due to the overproduction, consumers are looking for lower prices. Because they covered their nearby demands pretty thoroughly in December, consumers are taking very little, hardly enough to test prices, which are very erratic. These are stated to vary from 5.25c. to 5.40c., East St. Louis, but producers are not anxious to sell at these unprofitable levels. Probably a fair approximation of today's prices is 5.30c., East St. Louis, or 5.65c., New York. The weakness in the slab zinc market may cause further curtailment in ore production, which is regarded at present as fairly strong, with output at only 5500 tons last week, or 500 tons less than the preceding week. On the other hand, ore shipments advanced to 12,575 tons last week, the largest since last August. The surplus now stands at 35,925 tons, which is lower than it was at the end of June. The price is firm at $35, Joplin.

Antimony.—Spot Chinese metal is a little higher, due to the possibility of a tariff increase, and is quoted at 8.37½c., duty paid, New York. Futures are held at 8c.

Nickel.—Prices at the beginning of the year are unchanged, with ingot nickel in wholesale lots at 35c. a lb., shot nickel at 36c. and electrolytic nickel in cathodes at 35c.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted at 23.90c. a lb., delivered.

Non-Ferrous Metals at Chicago

CHICAGO, Jan. 7.—Sales in this market are opening up satisfactorily. Quotations on tin, zinc and antimony have given ground. The old metal market is quiet.

Prices per lb., in carload lots: Lake copper, 18.50c.; tin, 39.50c.; lead, 6.20c.; zinc, 5.50c.; in less-than-carload lots, antimony, 9.25c. On old metals we quote copper wire, crucible shapes and copper clips, 14c.; copper bottoms, 11.50c.; red brass, 11.50c.; yellow brass, 8c.; lead pipe, 4.50c.; zinc, 3c.; pewter, No. 1, 24.50c.; tin foil, 22c.; block tin, 32c.; aluminum, 12.87½c.; all being dealers' prices for less-than-carload lots.

Pig Iron Imports Drop Off in November

Incoming shipments of pig iron in November are reported by the United States Department of Commerce at 12,702 tons, of which India furnished more than one-half. This represents a reduction of more than 10 per cent from October, when 14,295 tons came in and India furnished 63 per cent of the total.

Compared with November, 1928, the latest month reported upon shows an increase of about 16 per cent, accounted for mainly by increased imports from Great Britain. There was a reduction in incoming tonnage from India, a reduction from Netherlands and a sizable importation from Sweden.

For the first 11 months there has been an increase of less than 1 per cent, the totals for the two years having been 130,591 in 1929 and 129,819 in 1928. The 1929 total is the largest since 1926, but, except for 1927 and 1928, is the smallest since 1921.

Of the incoming total India has supplied about 46 per cent in the year just ended, against 39 per cent in 1928; Great Britain has furnished 27 per cent, against 37 per cent; Netherlands has supplied more than 15 per cent, against 19 per cent. One feature has been the great increase in imports from Canada, which have gone beyond 7000 tons in 11 months, against less than 700 tons in the preceding year.

UNITED STATES IMPORTS OF PIG IRON BY COUNTRIES OF SHIPMENT

(In Gross Tons)

	November		11 Months Ended November	
	1929	1928	1929	1928
India	7,053	8,459	60,170	51,096
United Kingdom	3,235	250	35,138	47,504
Germany	....	....	103	395
France	....	....	101	330
Netherlands	500	1,938	20,429	24,666
Sweden	1,553	....	3,274	2,325
Norway	205	131	3,093	1,086
Canada	56	123	7,337	663
Belgium	100	....	284	222
All others	....	33	662	1,532
Total	12,702	10,934	130,591	129,819

Non-Ferrous Trade Practice Conference

WASHINGTON, Jan. 7.—The Federal Trade Commission has announced that the trade practice conference arranged for the non-ferrous ingot metal industry has been set for Feb. 6 at the Chamber of Commerce of the United States, Washington, Chairman G. F. Ferguson, Jr., to preside. It is expected that 75 per cent of the capacity of the industry will participate in the conference.

Lamson & Sessions Co. Acquires Foster Bolt

The Foster Bolt & Nut Co., Cleveland, has been purchased by the Lamson & Sessions Co., previously reported negotiations for the merger having been concluded. J. F. Donahue, president of the Foster company, will become vice-president, member of the executive committee and a director of the Lamson & Sessions Co. He will have charge of Western operations. Two other members of the Foster organization, A. M. Foster, Cleveland, and H. O. Smith, Buffalo, also will be elected to the board of the Lamson & Sessions Co., of which J. G. Jennings is chairman and George S. Case is president.

Celebrates Plant Extension

To celebrate the recent addition to its plant, which in the last year has doubled in size, and to welcome new members of its organization, which during the same period has grown from 750 to 1150, employees of the Leeds & Northrup Co., Philadelphia, held a minstrel show and dance in the ballroom of the Elks Club, Philadelphia, on the evening of Dec. 13, 1929.

This extension of the company's works takes in the neighboring plant formerly occupied by the Atwater Kent Mfg. Co., and increases the floor space from 2 to more than 4 acres. It is the fifth addition to the original plant, which was erected in 1903, shortly after the organization of the company.

Milwaukee Jobbers Merge

The Unity Sheet & Steel Co. and the Gibbs Steel Co., both of Milwaukee, have been consolidated, effective Jan. 1, under the name of the Gibbs Steel Co. The merged concern will continue to do a jobbing business in structural, sheet, plate and bar steel. George Gibbs, head of the old Gibbs company, is president of the new concern, and R. H. Frank, former general manager of Unity, becomes vice-president and sales manager.

Hyman-Michaels Co. and the Hyman-Michaels Tank Line, Inc., formerly located at 122 South Michigan Avenue, Chicago, have moved to the thirty-fourth floor at 20 North Wacker Drive.

PERSONAL

FRANCIS G. ECHOLS has been elected president of the Greenfield Tap & Die Corporation, Greenfield, Mass., succeeding FREDERICK H. PAYNE, who was elected chairman of the board. Mr. Echols's former position of vice-president and general manager has been filled by HARRY S. SOPER, previously connected with the Celluloid Corporation, Newark, N. J.

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E. R. WEBER, formerly assistant chief engineer at the R. D. Nuttall works, Westinghouse Electric & Mfg. Co., Pittsburgh, has resigned to become chief engineer of the Thomas Spacing Machine Co., Pittsburgh, manufacturer of structural and bridge machinery.

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EDWIN P. COREY, assistant general manager of sales of the Youngstown Sheet & Tube Co., has been promoted to general manager of sales of the company. He has heretofore had charge of pipe and wire products. The position is newly created, the duties having heretofore been handled by WALTER E. WATSON, vice-president, who continues in that capacity. L. E. WALLACE will succeed Mr. Corey.

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A. H. KRAMER, president, Advance Foundry Co., Dayton, Ohio, was elected vice-president of the Ohio Foundries Association, Inc., Cleveland, at a meeting of the board of administration held in Columbus, Dec. 17. He was chosen to fill the vacancy caused by the resignation of GEORGE ALTEN, Alten's Foundry & Machine Works, Lancaster, Ohio, who felt that he could not devote the necessary time to the association's activities. Mr. Alten will remain on the board of directors. Mr. Kramer has been a member of this board for several years.

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WALTER C. CARROLL, chairman of the board, Oil Well Supply Co., Pittsburgh, has resigned, effective Dec. 31. Prior to his connection with the Oil Well Supply Co., Mr. Carroll was vice-president of the Inland Steel Co., Chicago, and before that he was assistant general manager of sales of the American Sheet & Tin Plate Co., Pittsburgh.

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AMOS G. BUSSMANN has resigned as welding engineer of the American Steel & Wire Co., New York, to become president of the Standard Steel & Wire Co., Greensburg, Pa., manufacturer of welding wire. He was formerly chief chemist at the Donora steel works of the American Steel & Wire Co.

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J. B. HENRY, vice-president, Union Steel Casting Co., Pittsburgh, has resigned. He first became identified with the company in 1911 as construction engineer when the company was erecting a new foundry unit. With the completion of the construction work he remained with the company as general superintendent in charge of plant operations and in 1919 became vice-president. Before joining the Union company he was associated in both operating and sales capacities with the American Steel Foundries, Chicago; the Pittsburgh Steel Foundry Corporation, and the United Engineering & Foundry Co., Pittsburgh.

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JOHN C. ALLEN, recently chief mechanical engineer at the New Castle, Pa., works, Carnegie Steel Co., has been appointed assistant general superintendent, succeeding the late JOHN C. TAGGART. Mr. Allen has been succeeded as chief mechanical engineer by W. H. WILLIAMS, who has been assistant.

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SIR FREDERICK MILLS has resigned from the board of the Ebbw Vale Steel, Iron & Coal Co., Ltd., Ebbw Vale, Monmouthshire, England, of which company he has been chairman, and SIR JOHN W. BEYNON has been appointed to that position. Sir Frederick Mills, it will be remembered, was a speaker before the American Iron and Steel Institute, at the October meeting.

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JAMES VER MUELEN, who has been superintendent of the foundry of the American Seating Co., Grand Rapids, Mich., has been made assistant manager of the company, with headquarters at Chicago.

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HERBERT F. MOORE, research professor of engineering materials at the University of Illinois, delivered an address Dec. 17 on "Fatigue of Metals" before the Northwest chapter of the American Society for Steel Treating, Minneapolis.

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HARRY O'CONNOR, superintendent of the Anderson, Ind., mill of the American Steel & Wire Co., retired from active duty Jan. 1. He became affiliated with the steel industry 44 years ago at Salem, Ohio. He has been employed in different capacities with the steel industry at Beaver Falls, Pa., Pittsburgh, Cleveland and DeKalb, Ill. He was located at DeKalb for 17 years, as superintendent of the Steel Corporation's plant there for most of that period. He was transferred to Anderson as superintendent in 1916. Mr. O'Connor plans a rest at his country home, which is five miles west of Anderson, Ind. E. C. MORRISON, who has been assistant superintendent at the Anderson works for the past 15 years, has been promoted to superintendent.

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OWEN K. PARMITER, metallurgical engineer, Firth-Sterling Steel Co., McKeesport, Pa., will speak on stainless steels at a meeting of the Worcester chapter of the American Society for Steel Treating on Jan. 9.

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JOHN B. THOMAS, heretofore of the Keystone Steel & Wire Co., Peoria, Ill., has succeeded WILLIAM H. CHILDS as general sales manager for the Mid-States Steel & Wire Co., Crawfordsville, Ind. Mr. Thomas was recently made a director of the Mid-States company. The retiring sales director has accepted a similar position with the Continental Steel Co., Kokomo, Ind.

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ROBERT G. GUTHRIE, Peoples Gas, Light & Coke Co., Chicago, on Jan. 9 will present a paper on the carburization of iron and steel at a meeting of the Chicago chapter of the American Society for Steel Treating. Mr. Guthrie is president of the society for the year 1930.

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F. G. GROSSE, for 17 years in the machinery department of Joseph T. Ryerson & Son, Chicago, has become associated with Stocker, Rumely, Wachs Co., Chicago, dealer in machine tools.

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G. S. FERGUSON, JR., has been designated by the Federal Trade Commission to serve as its chairman during 1930, succeeding Commissioner EDGAR A. MCCULLOCH. Mr. Ferguson is a native of North Carolina, having been appointed to the commission from that State by President Coolidge in November, 1927. He formerly attended the United States Naval Academy and the University of North Carolina, graduating in law from the university in 1900. He was assistant general counsel of the Newport News Shipbuilding Co. from 1918 to 1921.

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WILLIAM CRANE BABBITT has been added as field engineer to the staff of the Industrial Truck Association, New York. He has had 10 years' experience in the management of industrial plants and in trade association work, and will aid the association in surveys of material-handling methods in various industries.

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R. F. HARRINGTON, Hunt-Spiller Mfg. Co., Boston, will address the members of the Hartford chapter, American Society for Steel Treating, Jan. 14, on "Impressions of European Gray Iron Foundry Practice."

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F. B. COYLE, research metallurgist, International Nickel Co., addressed the Montreal chapter of the American Society for Steel Treating, Jan. 6, on "High-Strength Cast Iron."

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ALEC S. FIELD, who has been chairman of the southwestern division of development and production engineering of the American Petroleum Institute for the past year, has become assistant director of sales of the Naylor Pipe Co.

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JAMES P. DOVEL has resigned as vice-president and manager of fur-

naces of the Sloss-Sheffield Steel & Iron Co., Birmingham, to devote his entire attention to his blast furnace engineering and contracting business.

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OLIVER SMALLEY, metallurgist with the Meehanite Metal Corporation, Chattanooga, Tenn., discussed foundry problems on Jan. 8 at the first meeting of the year of the Philadelphia Foundrymen's Association, held at the Manufacturers' Club, Philadelphia.

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GEORGE M. LAUGHLIN, JR., Jones & Laughlin Steel Corporation, has been elected a director of the American Iron and Steel Institute to fill the vacancy caused by the resignation of T. M. GIRDLER.

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NORBORNE BERKELEY, since 1922 assistant secretary of the Bethlehem Steel Co., Bethlehem, Pa., has been appointed assistant to President E. G. GRACE. Mr. Berkeley received his law degree from the University of Virginia in 1916 and practiced law in New York until this country entered the War, when he joined the Army. On his discharge in 1919, he entered the employ of the Bethlehem company.

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H. A. STEVENSON has been appointed representative in eastern Michigan for the Lewis-Shepard Co. line of lift trucks, stackers and skid platforms. His headquarters will be at 7310 Woodward Avenue, Detroit.

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E. T. RUNGE, cost consultant of the National Founders' Association, addressed the Wisconsin Gray Iron Foundry Group at the Hotel Schroeder, Milwaukee, Jan. 8, on "Practical Foundry Cost Problems."

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W. DOW HARVEY, heretofore of the American Steel Products Co., Macomb, Ill., has become general manager of the Globe Stove & Range Co., Kokomo, Ind.

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HENRY MEISTER, assistant superintendent of the Mid-States Steel & Wire Co., Crawfordsville, Ind., retired the first of the year, after 50 years in the steel industry.

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G. A. REINHARD, with offices at 1836 Euclid Avenue, Cleveland, has become representative in the Cleveland territory for Dings Magnetic Separator Co., Milwaukee.

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ERWIN E. DREESE, for the past five years chief engineer, Lincoln Electric Co., Cleveland, has been made head of the department of electrical engineering at Ohio State University.

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L. R. NOURIE has been appointed district representative, with offices in the Park Building, Pittsburgh, for northern West Virginia, eastern Ohio, western Pennsylvania and Allegany and Garrett counties in Maryland for the Despatch Oven Co., Minneapolis.

ALEXANDER F. JENKINS, president, Alexander Milburn Co., Baltimore, has returned from an extended tour in Europe and the Near East.

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G. DOUGLAS MORSE has been appointed New England representative, with offices at 24 Milk Street, Boston, for the Westcott Chuck Co., Oneida, N. Y. A new York office has been established at 25 Church Street under the direction of P. R. PAULSEN.

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W. E. BERG, for over 27 years with the Colorado Fuel & Iron Co., Denver, Colo., as chief draftsman from 1902 to 1913, chief engineer from 1913 to 1915, and since 1915 chief engineer of the water department, has retired under the company's service retirement plan.

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CHARLES E. LA CHAUSSEE, for the last 17 years identified with the advertising department of THE IRON AGE, has resigned to become an advertising representative in the New York territory for *Drug Topics*, 291 Broadway, New York. For two years Mr. La Chaussee has been in the Pittsburgh office, combining his duties there with those of advertising representative in the St. Louis territory. Previously he had been for some time assistant general advertising manager, with headquarters in New York.

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A. F. MARWICK, formerly general sales manager for the Pettibone-Mulliken Co., railroad specialties, Chicago, has joined the Chicago district sales staff of the Taylor-Wharton Iron & Steel Co. and William Wharton, Jr., & Co. G. G. WOOD, formerly located at the High Bridge, N. J., plant of the company, is now Western sales manager, with headquarters in San Francisco, and J. R. VAN RENSSELAER, formerly sales representative with Taylor-Wharton's San Francisco distributer, is now located at the New York office of William Wharton, Jr., & Co.

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ALLEN E. CHESTER, formerly research engineer with the Union Oil Co., has joined the sales staff of the Watson-Stillman Co., 75 West Street, New York.

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ARTHUR T. MOREY, who was general manager of the Commonwealth Steel Co., Granite City, Ill., from 1916 until a few months ago, when the Commonwealth was consolidated with the General Steel Castings Corporation, has retired after 25 years of service. He joined the Commonwealth in 1904 as general attorney. About 1912 he became interested in the problem of accident prevention, and then went to the plant to undertake this work. He was superintendent of the safety and fellowship departments until 1916, when he was made general manager.

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J. H. BELKNAP has been appointed manager of the control engineering department of the Westinghouse Electric & Mfg. Co., East Pittsburgh, succeeding E. B. NEWILL, who has been appointed assistant to the president, Delco Products Co., Dayton, Ohio, a subsidiary of the General Motors Corporation. Mr. Newill will also be identified with engineering development in the recently-formed company which will manufacture radio sets under the Radio-Victor Corporation license. Mr. Belknap, a graduate of the Oregon State Agricultural College, joined the Westinghouse control engineering department in 1923.

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JOHN E. WETZEL, for 14 years Eastern sales manager, with headquarters at Philadelphia, for the Superior Steel Corporation, Pittsburgh, has been appointed general manager of sales for that company. He was born at Conshohocken, Pa., and became identified with the iron and steel industry in 1903 with the Long-Mead Iron Co. at Conshohocken, of which he served for a time as superintendent. Later he went with the Sweet's Steel Co., Williamsport, Pa., as assistant to the president in charge of mills and sales. Before going with the Superior Company he was for four years associated with Henry Disston & Sons, Inc., Philadelphia.

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LEDYARD HECKSCHER, for many years active in the management of the Alan Wood Iron & Steel Co., as manager of the blast furnace department and vice-president in charge of operations, has been elected a director of the Lukens Steel Co., Coatesville, Pa., to fill the vacancy caused by the resignation of J. GIBSON MCILVAIN.

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J. TRANTIN, JR., formerly chief metallurgist and director of research of Pettibone-Mulliken Co., has become associated as metallurgical engineer with the Fort Pitt Steel Casting Co., McKeesport, Pa., and WILLIAM R. BECK has been appointed sales engineer.

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C. F. TREADWAY, heretofore secretary-treasurer, Peck, Stow & Wilcox Co., Southington, Conn., has been elected vice-president and will be the active head of the organization. G. S. CASE, the president, will give the company a portion of his time as before. O. J. BLANK, factory manager, has been appointed secretary.

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ARTHUR M. LONG has been appointed assistant general manager of sales of the Youngstown Sheet & Tube Co., with headquarters in Chicago. He has been in charge of tin plate sales at the main offices in Youngstown. He became affiliated with the company about three years ago, having formerly been in charge of tin plate sales for Trumbull Steel Co.

The Columbia Machine Works & Malleable Iron Co., 255 Chestnut Street, Brooklyn, N. Y., went into the hands of receivers Dec. 30.

Charles R. Hook New President of Armco

George M. Verity Becomes Chairman, Joseph H. Frantz Vice-Chairman and C. W. Verity Vice-President

AT the January meeting of the board of directors of the American Rolling Mill Co., George M. Verity was made chairman of the board, Joseph H. Frantz was elected vice-chairman and Charles R. Hook became president. Calvin W. Verity, who for a number of years had been

CHARLES R. HOOK

treasurer and assistant general manager, was elected vice-president and assistant general manager.

George M. Verity had been president of the company since its organization in January, 1900. Mr. Frantz had been vice-president for 16 years, and Mr. Hook had occupied the position of vice-president and general manager for seven years.

The company's announcement says:

"This action does not mean that Mr. Verity is going to give the company any less of his time or take any less interest in its affairs. He expects to continue to serve it in every way that he can for many years to come. This change in organization comes in the carrying out of Mr. Verity's own plans in the creation of efficient organization and represents the complete adaptation by the company of the modern scheme of corporate organization where a business is old enough and large enough to justify an active chairmanship.

"In this instance the chairmanship and vice-chairmanship do represent active relationships which give the company two senior executive officers for consultation and general direction, over and above a full complement of active and experienced officers who have been developed and trained within the company's own life and experience. It, in fact, represents a scheme of super-organization."

Mr. Hook, the new president, has been associated with the company for the past 28 years. During that time he has served in every managerial and executive position, from night superintendent of the original small sheet mill department up to vice-president and general manager of the company as now organized.

Calvin W. Verity has been in the active service of the company for the past 19 years. He spent all of his summers in the plant at Middletown from the time he was 14 years of age. He took up permanent service after graduation from Cornell University in 1911. He began active work as night superintendent in the Middletown East Side works boiler house. During the following eight years he served in various capacities in almost every branch of the company's business. In May, 1921, he was elected treasurer of the company and in 1923 he assumed the additional duties of assistant general manager, with supervision over the production problems of the company.

Niles Tool Works Co. Opens Its Own Sales Offices

Sales organizations of the Niles Tool Works Co. and the Pratt & Whitney Co. are to be separately conducted, the change having become effective Jan. 1. The Niles Tool Works Co. will have direct sales offices as follows: Chicago, 1853 Chicago Daily News Building; Detroit, 227 Curtis Building; New York, 454 New York Central Building; Pittsburgh, 1723 Grant Building.

The Chicago office will be in charge of A. C. Wais as Western manager. Associated with Mr. Wais will be F. T. McDonough and W. R. Mullinix. The Chicago office will also direct the sales in the St. Louis territory. B. A. Donahue will continue to represent the company in that territory, with offices at 1857 Railway Exchange Building.

The Detroit territory will be in charge of G. R. Shields, who was formerly at the Hamilton plant.

The Pittsburgh territory will continue to be served by P. C. McBeth as Pittsburgh manager, and L. McConnell. The Pittsburgh office will direct the sales in the Cleveland territory, and that territory will be served by C. A. Tankred, with offices at 418 Schoffield Building.

The New York territory will be in charge of D. S. Woods as Eastern manager. Associated with Mr. Woods will be S. M. Matchett and J. A. Ross. Mr. Ross will continue to handle the Philadelphia territory, with offices at 917 Widener Building.

The Cincinnati territory will be handled from the general offices at Hamilton, Ohio. The general sales work in connection with railroad tools will be under the supervision of A. T. Kuehner at Hamilton.

Sales agents as follows have been appointed: San Francisco territory: C. F. Bulotti Machinery Co., 829 Folsom Street, San Francisco; Seattle, Wash., territory: Hallidie Machinery Co., 2242 First Avenue South, Seattle; Texas and Louisiana: D. S. Mair Machinery Corporation, 505 Esperson Building, Houston, Tex., and 4521 Edmondson Avenue, Dallas; Southeastern territory: Pratt & Whitney Co., L. A. Quinn, Birmingham.

To Review Crane Safety Code

The section on overhead and gantry cranes of the safety code on cranes, derricks and hoists will be reviewed and further developed by American Society of Mechanical Engineers' subcommittee No. 1 of the Sectional Committee at a meeting to be held Jan. 20 and 21 at the Engineering Societies Building, New York.

Scovill Mfg. Co. To Buy A. Schrader's Sons, Inc.

The Scovill Mfg. Co., Waterbury, Conn., is to acquire A. Schrader's Sons, Inc., Brooklyn, maker of tire gages, valves and tools. The Scovill Mfg. Co. operates two Waterbury plants, and in addition owns the American Pin Co., Waterville, Conn., pins and buttons; the Oakville Co., Oakville, Conn., plumbing goods; Hamilton Beach Co., Racine, Wis., vacuum cleaners and electric household apparatus; Gilchrist Co., Newark, N. J., soda fountain supplies; and Morency-Van Buren Mfg. Co., Sturgis, Mich., plumbing supplies.

Weirton Steel Buys Mill Site at Gary, Ind.

Gary, Ind., has been selected as the site for a branch mill of the Weirton Steel Co., according to an announcement made at Chicago by William Morris, Jr., and Fred Hanlin, vice-presidents, who stated, however, that construction of a plant would not be begun in less than two or three years. The exact location of the property purchased was not disclosed.

All-Ohio Safety Congress

An all-Ohio safety congress will be held at the Neil House, Columbus, Jan. 14, 15 and 16. There will be talks by Frances Perkins, New York Industrial Commissioner, and W. T. Blake, director of Industrial Relations of Ohio, and other speakers prominent in safety work. There will be a dinner meeting for employees and plant executives at which L. B. Webster, secretary of the Ohio Manufacturers' Association, will act as toastmaster. There will also be various sectional meetings, including one covering foundries and other industries.

Slow Gain In By-Product Coke Capacity

FOR a number of years THE IRON AGE has published annually a statement showing the by-product coke oven capacity of the United States. This covers both iron and steel company plants and commercial or gas plants. Until last year the figures had been published as a large table, showing the entire set-up of plants all over the country. Last year, owing to pressure of space and to the small number of plants added, we published merely a list of the additional or new plants, and the large table was not repeated. The large table was last used in the issue of Jan. 26, 1928, pages 268-269.

Several new plants have been added during the year

Iron and Steel Company By-Product Coke Plants

Name of Company	No. of Ovens		Kind of Oven	Annual Capacity, Net Tons—Coal	Annual Capacity, Net Tons—Coke
Ashland By-Products Coke Co., Ashland, Ky.	108		Semet-Solvay	803,000	602,000
Bethlehem Steel Co.:					
Bethlehem, Pa.	424		Koppers	2,502,080	1,787,520
Steelton, Pa.	180	120	Semet-Solvay	423,360	302,400
		60	Koppers	404,320	288,960
Sparrows Point, Md.	421	360	Koppers	2,446,080	1,747,200
		(a) 61	Koppers-Becker	353,000	247,100
Lackawanna, N. Y.	231	60	Semet-Solvay	442,400	315,840
		171	Koppers-Becker	1,439,200	1,028,160
Johnstown, Pa.:					
Rosedale	208	120	Cambria-Improved	658,560	470,400
		88	Semet-Solvay	696,640	497,280
Franklin	208	50	Koppers	259,840	185,472
		104	Cambria-Improved	406,560	291,648
		77	Koppers-Becker	537,600	383,040
		(a) 77	Koppers-Becker	570,000	399,000
Total Bethlehem Steel Co.	1,772			11,139,540	7,944,020
Central Alloy Steel Corporation:					
Massillon, Ohio	49		Koppers-Becker	438,000	290,000
Canton, Ohio	62		Koppers	365,700	256,000
Total	111			803,700	546,000
Central Iron & Coal Co., Holt, Ala.	60		Semt-Solvay	290,000	220,000
Colorado Fuel & Iron Co., Minnequa, Colo.	120		Koppers	860,000	600,000
Columbia Steel Corporation, Provo, Utah	56		Koppers-Becker	613,000	400,000
Corrigan-McKinney Steel Co., Cleveland	204		Koppers	1,300,000	1,000,000
Davison Coke & Iron Co., Pittsburgh	70	(b)	Koppers-Becker	630,000	441,000
Donner-Hanna Coke Corporation, Buffalo	150		Koppers	1,000,000	700,000
Ford Motor Co., Dearborn, Mich.	240	120	Semet-Solvay	840,000	630,000
		120	Wilputte	985,000	739,000
				1,825,000	1,369,000
Gulf States Steel Co., Alabama City, Ala.	37		Koppers	263,370	186,138
Hamilton Coke & Iron Co., Hamilton, Ohio	45		Koppers-Becker	416,000	291,200
Inland Steel Co., Indiana Harbor, Ind.	277	130	Koppers	890,000	623,000
		73	Koppers-Becker	620,900	434,650
		(b) 74	Koppers-Becker	571,225	399,857
				2,082,125	1,457,507
Ironton By-Product Coke Co., Ironton, Ohio	60		Semet-Solvay	730,000	547,000
Jones & Laughlin Steel Corporation, Pittsburgh	360	60	Wilputte	438,000	306,600
		300	Koppers	2,000,000	1,400,000
Aliquippa	203	122	Koppers-Becker	1,100,000	770,000
		(a) 81	Koppers-Becker	852,000	596,400
Total Jones & Laughlin	563			4,390,000	3,073,000
Otis Steel Co., Cleveland	100		Semet-Solvay	475,000	356,250
Perry Iron Co., Erie, Pa.	37		Wilputte	300,000	210,000
Pittsburgh Crucible Steel Co., Midland	100		Koppers	667,000	446,900
Portsmouth By-Product Coke Co., Portsmouth, Ohio	108		Semet-Solvay	770,000	559,000
		110	Koppers	800,000	560,000
Rainey-Wood Coke Co., Swedeland, Pa.	151	(b) 41	Koppers-Becker	281,000	196,700
				1,081,000	756,700
Republic Iron & Steel Co.:					
		100	Koppers	667,000	466,900
Youngstown, Ohio	204	104	Koppers-Becker	957,500	670,000
Thomas, Ala.	57		Koppers-Becker	720,500	504,350
Total Republic Iron & Steel	261			2,345,000	1,641,250
St. Louis Gas & Coke Corporation, Granite City, Ill.	80		Roberts	750,000	525,000
Sloss-Sheffield Steel & Iron Co., Birmingham, Ala.	120		Semet-Solvay	1,000,000	750,000
Toledo Furnace Co., Toledo	94		Koppers	560,000	392,000
Trumbull-Cliffs Furnace Co., Warren, Ohio	64		Koppers-Becker	636,000	414,000
Weirton Steel Co., Weirton, W. Va.	83		Koppers-Becker	830,000	581,000
		94	Koppers	610,000	427,000
Wheeling Steel Corporation, East Steubenville, W. Va.	145	51	Koppers-Becker	346,750	242,725
				956,750	669,725
		88	Wilputte	578,000	404,600
Wisconsin Steel Co., South Chicago	133	(a) 45	Koppers-Becker	363,000	254,100
				941,000	658,700
		170	Koppers	1,051,200	735,840
Woodward Iron Co., Woodward, Ala.	220	60	Wilputte	371,000	259,700
				1,422,200	995,540
Youngstown Sheet & Tube Co.:					
Youngstown, Ohio	390		Koppers	2,319,000	1,083,000
		70	Koppers-Becker	740,000	518,000
Indiana Harbor, Ind.	190	120	Semet-Solvay	893,000	620,000
Total Youngstown S. & T.	580			3,952,000	2,221,000
		41	Koppers-Becker	350,000	245,000
Zenith Furnace Co., West Duluth, Minn.	106	65	United-Otto	225,000	158,000
				575,000	403,000

Name of Company	No. of Ovens		Kind of Oven	Annual Capacity, Net Tons—Coal	Annual Capacity, Net Tons—Coke
United States Steel Corporation: American Steel & Wire Co., Cleveland	180		Koppers	1,360,000	950,000
Carnegie Steel Co., Clairton, Pa.	1,482	768	Koppers	10,500,000	6,531,000
		714	Koppers-Becker		
Illinois Steel Co.:					
Gary, Ind.	838	700	Koppers	5,942,200	4,545,800
		138	Koppers-Becker		
Joliet, Ill.	280		Koppers	1,727,000	1,313,600
Total	1,118			7,669,200	5,859,400
Minnesota Steel Co., Duluth, Minn.	90		Koppers	510,000	375,000
National Tube Co., Lorain, Ohio	208		Koppers	1,581,000	1,120,000
Tennessee Coal, Iron & R. R. Co., Fairfield, Ala.	497	434	Koppers	3,462,400	2,436,250
		63	Koppers-Becker		
Total United States Steel Corp.	3,575			25,082,600	17,271,650
Total all companies	9,840			69,489,385	48,228,589

Commercial or Gas Plants

Name of Company	No. of Ovens		Kind of Ovens	Annual Capacity, Net Tons—Coal	Annual Capacity, Net Tons—Coke
Alabama By-Products Corporation, Tarrant, Ala.	149	100	Koppers	669,000	468,300
		49	Koppers-Becker	500,000	350,000
				1,169,000	818,300
Battle Creek Gas Co., Battle Creek, Mich.	18		Koppers-Becker	88,700	62,100
Brooklyn Union Gas Co., Brooklyn	90		Koppers-Becker	800,000	560,000
By-Products Coke Corporation, South Chicago	230	120	Semet-Solvay	700,000	525,000
		110	Koppers-Becker	1,000,000	700,000
				1,700,000	1,225,000
Camden Coke Co., Camden, N. J.	37		Koppers	205,800	144,100
Central Indiana Gas Co., Muncie, Ind.	22		Klonne	40,000	28,000
Central Public Service Corporation, Rockford, Ill.	21		Koppers-Becker	105,000	73,500
Chicago By-Products Coke Co., Chicago	105	5	Koppers-Becker	800,000	600,000
		100	Koppers		
Citizens' Gas Co., Indianapolis	161	80	Wilputte	394,200	295,650
		41	Semet-Solvay	224,475	168,356
		(a) 40	Wilputte	360,000	252,000
				978,675	716,006
Coal Products Mfg. Co., Joliet, Ill.	53	35	Koppers	225,000	157,500
		18	Wilputte	115,000	80,500
				340,000	238,000
Connecticut Coke Co., New Haven, Conn.	61		Koppers-Becker	416,000	291,200
Consolidated Gas Co., Hunt's Point, N. Y.	74		Koppers-Becker	638,750	447,100
Consumers Power Co., Jackson, Mich.	63		Koppers-Becker	257,500	180,250
Diamond Alkali Co., Alkali, Ohio	46		Koppers-Becker	431,430	303,021
Domestic Coke Corporation, Fairmont, W. Va.	60		Koppers	400,000	280,000
Empire Coke Co., Geneva, N. Y.	46		Semet-Solvay	146,000	102,200
Hudson Valley Coke & Products Corp., Troy, N. Y.	55		Foundation	540,000	380,000
Indiana Consumers Gas & By-Prod. Co., Terre Haute, Ind.	60		Koppers	400,000	280,000
Laclede Gas Light Co., St. Louis	64	56	Koppers	320,000	224,000
		8	Piette	40,000	28,000
				360,000	252,000
Linton Gas Co., Linton, Ind.	3		Gas Machines	15,000	10,500
Lynn Gas & Electric Co., Lynn, Mass.	11		Koppers-Becker	54,000	37,800
Michigan Alkali Co., Wyandotte, Mich.	39		Koppers-Becker	324,000	226,800
Milwaukee Coke & Gas Co., Milwaukee	180	80	Semet-Solvay	343,000	240,100
		100	Koppers	679,000	475,300
				1,022,000	715,400
Minnesota By-Products Coke Co., St. Paul, Minn.	65		Koppers	400,000	280,000
New England Fuel & Trans. Co., Everett, Mass.	533	400	United-Otto	650,000	455,000
		51	Wilputte	372,000	260,610
		(a) 82	Koppers-Becker	615,000	430,500
				1,637,000	1,146,110
North Shore Coke & Chemical Co., Waukegan, Ill.	43	31	Koppers-Becker	165,000	115,500
		13	Semet-Solvay	55,000	38,500
				220,000	154,000
Northern Indiana Gas & Electric Co., Fort Wayne, Ind.	19		Koppers-Becker	94,300	65,000
Philadelphia Coke Co., Philadelphia	74	(b)	Koppers-Becker	728,000	509,600
Philadelphia Suburban Gas & Electric Co., Philadelphia	25		Roberts	165,000	120,500
Providence Gas Co., Sassafras Point, R. I.	65	40	Koppers	240,000	168,000
		(a) 25	Koppers-Becker	188,000	131,600
				428,000	299,600
Rochester Gas & Electric Corp., Rochester, N. Y.	97	60	Koppers-Becker	274,000	191,800
		(a) 37	Koppers-Becker	164,000	114,800
				438,000	306,600
Seaboard By-Products Corporation, Kearny, N. J.	165		Koppers	1,200,000	840,000
Seattle Lighting Co., Seattle, Wash.	20		Klonne	70,000	42,350
Semet-Solvay Co.					
Detroit	216		Semet-Solvay	1,423,000	1,081,000
Buffalo	120		Semet-Solvay	1,053,000	795,000
Dunbar, Pa.	110		Semet-Solvay	240,000	173,000
Ensley, Ala.	240		Semet-Solvay	730,000	547,000
Total, Semet-Solvay Co.	686			3,446,000	2,596,000
Tennessee Products Corporation, Alton Park, Tenn.	24		Semet-Solvay	175,000	125,000
Utica Gas & Electric Co., Utica, N. Y.	42		Koppers-Becker	200,000	110,000
West Boston Gas Co., Framingham, Mass.	15		Koppers-Becker	47,523	33,266
Wisconsin Public Service Co., Sheboygan, Wis.	15	(b)	Koppers-Becker	45,000	31,500
Total Commercial or Gas Plants	3,536			20,525,678	14,630,803
Total All Plants	13,376			90,015,063	62,859,383

(a) Under construction, Jan. 1, 1930.
(b) Completed in 1929, according to reports.

and these, together with the additions of the preceding year, have made it advisable to use the complete table again. As listed here, the new additions are indicated, whether already in service or still under construction on Jan. 1.

Under construction are 448 by-product coke ovens, most of which are pretty well advanced toward completion. This group has a coal carbonizing capacity for 3,465,000 net tons and a coke capacity of 2,425,500 net tons. The coke capacity has been figured, for the new ovens, at 70 per cent of the calculated coal carbonizing capacity—the accepted practice.

With the addition of these new units the total coal carbonization capacity of the country, in 13,376 ovens, figures out at 90,015,063 net tons and the coke capacity at 62,859,383 tons. The increase in two years has been 620 ovens, with 6,188,425 tons coal carbonization and 4,306,657 tons coke capacity, annually.

Molybdenum Steels Popular

(*Continued from page* 144)

widely used for aircraft fuselage and wing skeletons, aiming at C 0.25, Mn less than 0.6, Cr 0.9, Mo 0.3.

This may be fabricated into thin-walled seamless tubing without undue waste or wear on dies; minimum size limits in 1928 were ¼ in. outside diameter by 0.028 in. wall thickness. It is used in its normalized condition; it welds soundly under the oxy-acetylene flame, using either alloy rod or low-carbon steel. Owing to its air-hardening propensities, resistance to grain growth, and lack of temper-brittleness, the heated portion just alongside of the weld has nearly the same strength as the unheated tubing; for this reason it is greatly superior, after welding, to medium carbon material strengthened by cold work. Comparative figures are:

	Chromium-Molybdenum Tubing		Cold-Drawn Steel Tubing	
	Normalized Tube	Strength Alongside Weld	Original Tube	Strength Alongside Weld
Tensile strength	98,000	96,000	More than 80,000	65,000
Yield point	75,000	70,000	More than 60,000	
Proportional limit				37,000

Sheet of this same analysis is used to a considerable extent for fittings. In the normalized condition it can be bent 180 deg. about a pin equal in thickness to the sheet without cracking; annealing increases the workability and ductility even more. Welded assemblages of sheet and tubes are ordinarily oil quenched from 1625 deg. Fahr., and tempered at 1000 deg. Fahr., which will develop a minimum tensile strength of 125,000 lb. per sq. in. Properties of the unwelded sheet and tubing after various heat treatments are shown on page 143.

Nickel-Chromium Molybdenum Steels for Heavy Forgings

NICKEL-CHROMIUM steel with molybdenum is not now used in America to the extent one might suppose from the advertising it got in war years. When the price of molybdenum shot upward it was persistently rumored that England was buying all of the supply because captured enemy cannon were found to be made of high molybdenum steel, said to be hard at high temperature and consequently eroded less by the hot powder gases. It is more likely that the most of the war-time supply went into armor and armor-piercing projectiles, where its toughening and deep hardening influence are of the highest value. Full appreciation of the value of molybdenum in nickel-chromium steels did not come until after the war; in fact, a recent report from Woolwich arsenal (England) speaks of the production of heavy gun tubes of such steel as being a major metallurgical achievement of post-war years. So it seems that, after all, the war-time rumor was right about the value of molybdenum in large rifled gun tubes, but it is not so much due to resistance to erosion as to the high yield point of the alloy, the relative absence of mass effect in heat treatment, and the lack of segregation, of transverse brittleness or of temper brittleness.

Experiments at the arsenal with a considerable number of analyses indicated the following range to have the best combination of properties: C 0.3, Si 0.15, Mn 0.5, Ni 2.5, Cr 0.6 to 1, Mo 0.6 to 0.4 per cent. One hundred-ton ingots after being forged into big gun jackets, 20 in. internal diameter and 10-in. wall, annealed at 1600 deg. Fahr., oil hardened from 1550 deg. Fahr., and tempered at 1200 deg. Fahr., have the following properties, when the test pieces are cut parallel with the axis of the forging:

Ultimate strength, lb. per sq. in.	145,000 to 155,000
Elastic limit, lb. per sq. in.	105,000 to 110,000
Yield point, lb. per sq. in.	125,000 to 137,000
Elongation, per cent	17 to 19
Reduction in area	37 to 50
Brinell hardness	314 to 324
Izod impact, ft.-lb.	19 to 32

Hardness explorations showed variations of from 6 to 15 Brinell numbers, surface to center, on forged and heat-treated tubes with walls 4½ to 12 in. thick (compared with a maximum variation of 62 numbers in similar nickel-chromium steel forgings, 3½ to 8 in. thick). Whereas in plain chromium steels it is necessary to control the time and temperature of quenching, and while some nickel-chromium steels have a narrow range of tempering temperatures, the nickel-chromium-molybdenum steel described above will harden properly if cooled at the comparatively slow rate of 5 deg. per min., and also is free from temper brittleness. This enables one to get a wide range of physical properties by selecting the correct treatment.

American practice on thick forgings is to lower the alloy content still further. Representative analyses follow:

	Die Blocks	Heavy Crank Shafts	Hammer Rams
Carbon	0.60	0.35	0.30
Chromium	0.75	0.75	0.75
Nickel	1.5	1.5	1.5
Molybdenum	0.70	0.20	0.20

Die blocks of the above analysis, 6 in. thick, can be air hardened and then tempered to Brinell hardness 430 at corners, 418 at face and 402 at center. Possibly three-quarters of the die blocks used in the United States are of this general character.

Liberty Engine Crankshafts

A nickel-chromium-molybdenum steel was among the earliest alloy steels containing molybdenum used commercially in the United States. In the form of crankshafts for Liberty engines they corresponded substantially to the analysis given above for English gun tubes, except that nickel was 3 per cent. Briefly, the process of manufacture and heat treatment was as follows: They were forged, then twisted, then annealed at 1625 deg. Fahr. for 1.5 hr., and air cooled to relieve internal strains. They were then water quenched after a 30-min. heat at 1475 deg. Fahr., and drawn 2 hr. at 1150 deg. Fahr. During air cooling from the latter operation they were straightened (if nec-

essary) before reaching 800 deg. Fahr. At this time they were ready for machining, and had the following physical properties: ultimate strength 142,000 lb. per sq. in., yield point 130,000 lb. per sq. in., elongation in 2 in. 20.5 per cent, reduction in area 65 per cent, Brinell hardness 300, Izod impact 67. Service results from these shafts were excellent. Machining was rather difficult, especially when the yield point ranged up to 135,000 lb. Experience has shown that nickel must be reduced to 2.5 per cent if first class surfaces are to be secured in mass production operations.

Toughened Armor Plate

In peace times the manufacture of armor is almost nonexistent. It may be mentioned in passing, however, that the substitution of 0.6 per cent molybdenum for an equal weight of the nickel in the conventional 5 per cent nickel steel (containing 0.30 carbon) produced a steel with higher elastic limits and ductility, and improved the rolling properties, the machinability and also the ballistic properties of light armor for tanks and field-gun mounts. The plates were quenched from 1625 deg. Fahr., and not drawn.

Lower nickel-chromium-molybdenum steel with low carbon also makes bullet-proof rivets; they drive easily and air harden sufficiently to resist point-blank machine-gun fire.

Molybdenum in Carbon Steel

THE experiments at Woolwich arsenal noted above indicate that the maximum useful amount of molybdenum varies inversely with the total of other alloying metals. Thus, the full advantage of molybdenum may be had if 0.35 per cent is added to a steel containing Ni 3.5, Cr 1, whereas as much as 0.80 per cent molybdenum may be usefully added to a steel containing Ni 2, Cr 1. This would indicate that plain carbon steels might carry more than one per cent molybdenum to advantage.

As a matter of fact carbon-molybdenum steels have not been popular, even though they have this to recommend them: In mild and medium carbon steels three points of molybdenum have about the same hardening power as one point of carbon, and hardened molybdenum steels have considerably better impact values after all draws above 750 deg. Fahr. An unfavorable factor is that carbon-molybdenum steels have low proportional limits in the normalized condition.

Exceptions to the general statement that carbon-molybdenum steels are not used may be taken as follows: (a) an ingot iron containing approximately 0.5 copper and 0.10 molybdenum, exploited as "Toncan" metal for its resistance to atmospheric corrosion in competition with either ingot iron or low-carbon steels containing 0.25 per cent copper; (b) a low-carbon steel with 0.25 molybdenum, which has been used for pressed steel automobile frames, axle housings and wheel rims on account of its extreme ductility; and (c) higher carbon sheets (0.45 per cent carbon and 0.80 molybdenum) used in the heat-treated condition for scoops and shovels.

Molybdenum in Tool and Magnet Steels

MOLYBDENUM and tungsten tools date well back into last century. In 1868 Robert F. Mushet introduced the first air-hardening steel containing tungsten and manganese; his experiments indicated that molybdenum could be substituted for tungsten, but was then too rare to be used. In steels made a few years later chromium replaced the manganese. Many efforts were made, especially in America, to use molybdenum, and a type of air-hardening tool steel much used prior to the development of the true high-speed steel contained C 1.75 to 2.0 per cent, Mo 3.75 to 4.25 per cent and Cr 3.75 to 4.25 per cent.

Molybdenum and tungsten are quite similar chemically, falling in the same group in the periodic system of elements. The atomic weights are 96 and 184, respectively, indicating that pound for pound the former would contain twice as many atoms, and probably be about twice as effective as an alloying metal. As a matter of fact, substitutions in high-speed steel have usually been made on the basis of 2½ to 1. But despite a great amount of work on various combinations of elements, the molybdenum-chromium-vanadium alloy has not been accepted as a substitute for the well-established tungsten-chromium-vanadium high-speed steel.

It has been said that molybdenum is vaporized from the steel during heating and forging, thus producing a soft surface. It is more likely that the light yellow smoke then observed is molybdenum oxide coming from the scale, because analyses of the surface layers of hardened tools show no loss in molybdenum.

Experimenters generally report that cutting tests are erratic; some very good tools will be found, with some rather poor ones. It would appear that in an emergency, if tungsten were unobtainable, molybdenum could satisfactorily be substituted for it in high-speed steel, but as long as adequate supplies of tungsten are available at a moderate price, there is no incentive for tool steel manufacturers and users to perfect the melting, manufacture and heat-treatment technique, merely to get another tool steel just as good as the standardized product.

Similarly magnet steels containing 2 to 4 per cent molybdenum were thoroughly investigated at the turn of the century. Permanence of magnetism was found to be satisfactory, but they were low in residual density. Their worst fault was again an erratic response to heat treatment, in contrast to the "fool-proof" qualities of the engineering alloys containing a fractional per cent of the element. Slight variations in temperature or cooling rates have a pronounced effect upon the magnetic properties of even the best magnet steels, and molybdenum seems to make them even more erratic. For this reason they have never been exploited.

High Molybdenum Alloys

Systematic researches into theoretical metallurgy have recently discovered at least two high molybdenum alloys of considerable utility, and they may be accepted as an indication of what future work will discover.

One is a carbon-free alloy (it cannot be classed as a "steel") of 22 per cent molybdenum and 78 per cent iron. It has been used for swaging and drawing dies for hot tungsten wire. After slow cooling from 2550 deg. Fahr. it may be readily machined; it is then water-quenched from the same temperature and aged at 1150 deg. Fahr. This induces intense hardness (Rockwell 58C) which is permanent at all lower temperatures.

A second interesting development is a ductile alloy which resists hot or cold hydrochloric acid effectively. It is probably the only metallic combination (other than the "noble" precious metals) which can resist this acid. It contains

Iron	20 per cent
Molybdenum	20 per cent
Nickel	57 per cent
Manganese	3 per cent or less
Silicon	Less than 0.5 per cent
Carbon	0.2 per cent

Large hollow forged steel drums have been ordered from a Sheffield, England, firm by Babcock & Wilcox for the new Ford works at Dagenham, Essex, England. These will be made from steel ingots each weighing about 150 tons and will be 45 ft. long and 4 ft. inside diameter, with walls 5 in. thick. They will be hydraulically tested to 2100 lb. per sq. in.

Unsettlement Persists in Foreign Steel

European Markets Not Over Holiday Recession, But Revival Is Thought Imminent—Steel Cartel Prices Shaded by Cash Discounts

(*By Cable*)

LONDON, ENGLAND, Jan. 6.

THE iron and steel markets have been influenced by the holidays, but a revival of business is considered imminent. Cleveland furnaces have increased their stocks, and are now able to meet the probable demand for iron, which is still largely confined to local users.

Hematite iron prices are firm, although tonnages for prompt shipment are obtainable at slight concessions to reduce stocks. The market for February-March delivery is firmly maintained.

Finished steel is quiet, but export prices are stiffening. Works are generally well engaged, but plate specifications are needed.

Tin plate demand is reviving since the holidays, and further good business is expected before long. Mills are in a very satisfactory position.

Galvanized sheets are quiet. Black sheets, Japanese specifications, are inactive, as well as the heavier gages.

The Ebbw Vale Iron & Steel Co. plants have been closed and the company is to concentrate on fuel production. Arrangements are proceeding for resuming operation of several collieries.

The Continental market is still somewhat unsettled by efforts of mills to fix minimum prices and extras, so that business here has been negligible.

The International Rail Makers' Association is making no change in prices for the first quarter. French output in November was 865,000 metric tons of pig iron and 847,000 tons of raw steel. At the end of November there were 156 furnaces in blast.

British Steel Prices Advanced

Higher Raw Material Costs Necessitate Increase—British Export Association to Allocate Large Foreign Orders

LONDON, ENGLAND, Dec. 20.—Business in pig iron and steel is quiet and no new developments are expected until after the holidays. The only feature of the market is an advance in steel prices of 2s. 6d. to 7s. 6d. (61c. to $1.83) a ton, by the British Steel Makers' Association. Although an increase at this time might be considered inopportune, British mills have for some months had to contend with a steady advance in the cost of raw materials. Generally, the mills are fairly well booked with business.

At the annual meeting of Dorman, Long & Co. last week, Sir Arthur Dorman, chairman of the board, said that business prospects were good in most departments, although the possibility of increased taxation and labor trouble was a depressing influence. He pointed out, however, that the world's requirements of iron and steel are large and suggested that a heavy buying movement might develop before the end of 1930. Opposed to this viewpoint was that of Lord Furness, as voiced at the recent annual meeting of the Cargo Fleet Iron Co. and the South Durham Steel & Iron Co., of which he is chairman. His view of the business situation was pessimistic, particularly in relation to the Government's proposed coal bill, which, if adopted, will increase the cost of deliveries from his company's coal mines to its own iron and steel works.

The British Steel Makers' Export Committee, which has been functioning during the past 18 months in quoting on and allocating orders for plates and shapes of more than 250 tons for certain overseas markets, will function in the future as the British Steel Makers' Export Association. Management is to be under Julian Piggott, who has been associated with David Colville & Sons, and who accompanied missions of the committee to Canada and more recently to South America. There will be no change in the administration, but a subcommittee of district managers will be formed to work in conjunction with the association. The

British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp, with the £ at $4.88

British Prices f.o.b. United Kindom Ports

Cleveland No. 3 foundry	£3	12½s.	to	£3	13½s.	$17.69	to	$17.93
East Coast hematite	3	18½	to	4	1	19.03	to	19.76
Ferromanganese, export	12	5	to	12	15	59.42	to	62.22
Billets, open-hearth	6	2½	to	6	12½	29.89	to	32.33
Sheet bars, open-hearth	5	17½	to	6	10	28.67	to	31.72
Black sheets, Japanese specifications	12	10				61.00		
Tin plate, per base box	0	18¾	to	0	19	4.57	to	4.64
Rails, 60 lb. and heavier	7	15	to	8	15	37.59	to	42.43
						Cents per Lb.		
Steel bars, open-hearth	8	0	to	8	10	1.74	to	1.85
Beams, open-hearth	7	7½	to	7	17½	1.60	to	1.72
Channels, open-hearth	7	12½	to	8	12½	1.66	to	1.91
Angles, open-hearth	7	7½	to	7	17½	1.60	to	1.72
Ship plates, open-hearth	7	15	to	8	5	1.69	to	1.79
Black sheets, No. 24 gage	10	0	to	10	5	2.18	to	2.23
Galvanized sheets, No. 24 gage	12	7½	to	12	10	2.69	to	2.72

Continental Prices, f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 0.50 to 0.90 per cent phos.	£3	7s.	to	£3	11½s.	$16.35	to	$17.45
Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	3	6	to	3	7	16.11	to	16.35
Billets, Thomas	4	11	to	4	12½	22.20	to	22.57
Sheet bars, Thomas	4	11	to	4	13	22.20	to	22.69
Wire rods, low C., No. 5 B.W.G.	6	2	to	6	4	29.77	to	30.26
Rails, 60 lb. and heavier	6	8½	to	6	10*	31.35	to	31.72
Rails, light	6	1½				29.65		
						Cents per Lb.		
Steel bars, merchant	5	5	to	5	6	1.14	to	1.15
Steel bars, deformed	5	3	to	5	5	1.12	to	1.14
Beams, Thomas, British standard	5	0	to	5	4	1.09	to	1.13
Channels, Thomas, American sections	5	10	to	5	17	1.19	to	1.27
Angles, Thomas, 4-in. and larger, over ⅝-in. thick	5	0	to	5	6	1.09	to	1.15
Angles, Thomas, 3-in.	5	6				1.14		
Ship plates open-hearth inspected	7	5				1.58		
Black sheets, No. 31 gage, Japanese	12	3	to	12	4	2.47	to	2.66
Hoop and strip steel over 6-in. base	5	11½	to	5	12½	1.21	to	1.22
Wire, plain, No. 8 gage	7	0				1.52		
Wire, galvanized, No. 8 gage	8	9				1.83		
Wire, barbed, 4-pt. No. 12 B.W.G.	11	2½				2.42		
Wire nails, base	0	6¼				$1.55 per keg		
Wire nails, assortments 1 to 6-in. keg	10	6½				2.69		

*Open-hearth steel, 8s. ($1.94) per ton extra.

export association will not quote prices or accept orders, but will distribute inquiries and allocate tonnage when it is secured.

Steel Industries of Great Britain, Ltd., formed in June to acquire from Austin Friars Trust the shares and securities of the United Steel Companies, Ltd., has not been affected by the failure of Austin Friars Trust, one of the Hatry companies now in course of liquidation. All securities and shares of the United Steel Companies against which shares of the Steel Industries of Great Britain had been allotted had been delivered.

Steel Cartel Prices Shaded by Discounts for Cash

HAMBURG, GERMANY, Dec. 23.—Although the International Steel Cartel, through its recently formed selling organization, has fixed prices on bars and structural shapes, lower quotations have continued to appear, despite claims by members of the cartel that they are strictly adhering to the schedule. The lower prices have been attributed by sellers to old contracts, but actually concessions have been made on new business by granting discounts for cash. The official price is £5 5s. per ton (1.16c. per lb.) for bars and £4 19s. per ton (1.09c. per lb.) for shapes. Contracts are made at these prices by mills in Belgium, France, Luxemburg, Germany and the Saar, but instead of terms of net cash against shipping documents, the seller quotes payments in 90 days after the date of the invoice and grants a discount of 1s. to 2s. (24c. to 49c.) per ton for cash. This brings the actual cost to the buyer who pays cash down to £5 4s. or £5 3s. per ton (1.15c. or 1.14c. per lb.) for bars.

German Steel Cartel Is Renewed for 10 Years

DÜSSELDORF, GERMANY, Dec. 23.—An agreement renewing the German Steel Cartel for 10 years was signed Dec. 20. The syndicate will expire Feb. 1, 1940, unless members give notice of withdrawal before Feb. 1, 1935. The rather difficult question of new allotments was evaded by not fixing any tonnages, but no member will be permitted to expand output without the consent of the other members.

In the future, only 25 per cent of the output of steel bars will be sold through the cartel; the remainder will be disposed of directly by the mills. The Stahlwerke Becker at Willich, Stahlwerke Hennigsdorf, Rheinische-Westfahlische Stahl und Walzwerke and the Rasselsteiner Eisenwerke have become members of the cartel. All producers in the Saar are now members.

The system of refunds to exporting manufacturers has also been extended for 10 years. A new agreement will be made with exporters and with steel merchants distributing in Germany. The new cartel covers the following groups of products: bars and shapes, rails and accessories, plates, wire rods and hoops, and tubes. The early establishment of a sheet cartel is considered probable.

German Ford Company Seeks Export Refunds

HAMBURG, GERMANY, Dec. 23.—The Ford Motor Co., Berlin, has filed a petition with the German finance ministry requesting refunds from duties paid on imports, where the material has been re-exported in motor cars. It is expected that the ministry will grant the petition, subject to the company's exporting a minimum number of cars annually.

Tungsten Ore Consumers Buy Cooperatively

HAMBURG, GERMANY, Dec. 23.—A cooperative organization for the purchase of tungsten ore has been organized by the principal European producers of tungsten alloy steel. Since its formation, the price of Chinese and Indian ore has been reduced from 36s. to 37s. ($8.78 to $9.03) per unit to 31s. to 32s. ($7.56 to $7.80) per unit. The present European members of the association are urging American importers and steel mills to join, and a meeting with them has been arranged for in January.

Shipments and Orders of Fabricated Sheet Steel Products

			November, 1929	October, 1929	November, 1928
Steel furniture,	new orders(a)		$2,900,452(b)	$2,848,741	$2,675,664
do.,	do.,	11 months	31,070,147	.....	32,363,472(c)
do.,	shipments		2,631,079	2,983,615(b)	2,854,312
do.,	unfilled orders		2,345,471(d)	2,059,474	1,916,890
Steel shelving,	new orders(a)		801,223(e)	927,578	875,354
do.,	do.,	11 months	10,818,885(e)	.....	8,772,477
do.,	unfilled orders		950,437	1,014,754	720,888
Sheet-metal ware:					
Enameled,	shipments, dozens(a)		305,714	371,292	322,875
do.,	do.,	11 months	4,112,579(c)	.....	3,869,422
do.,	do.,	value	$1,257,935	$1,538,021	.....
do.,	do.,	11 months	14,941,057	.....	$14,690,099
Galvanized	do.,	dozens(a)	120,807	184,708	137,302
do.,	do.,	11 months	1,539,339	.....	1,660,599
do.,	do.,	value	$473,705	$763,009	.....
do.,	do.,	11 months	4,936,799	.....	$5,409,956

(a)United States Department of Commerce. (b)Largest since last February. (c)Largest ever reported. (d)Largest since last May. (e)Smallest since September, 1928.

Demand for Large Quotas May End Tube Cartel

(By Radio)

BERLIN, GERMANY, Jan. 6.

DOMESTIC and export steel markets continue dull, except for reports by the Stahlwerksverband of substantial foreign orders for semi-finished material. Domestic quotations are unchanged for January. The export market for steel bars is slightly improved as a result of the limitation of German production and the International Steel Cartel agreement fixing minimum prices. The market for steel bands is improved.

Prolongation of the International Steel Cartel is practically assured, but renewal of the Continental Tube Cartel is threatened by the demands of Czechoslovakia, Hungary and Poland for increased quotas. If the present negotiations for prolonging the cartel are not successful by the end of March, the international agreement of tube mills will terminate and this will include the agreements with British and American producers.

Russian Manganese Ore Exports to Increase

Fifty years ago the first shipment of Chiatura manganese was made from Georgia to the Europian market, says the *Soviet Union Review*. Since the opening of the Chiatura fields 16,977,786 tons of manganese has been mined, of which 14,647,959 tons has been exported. In 1913, over 1,066,000 tons of manganese, which constituted 42 per cent of the world's export, was exported from Georgia. After the war the export of manganese was resumed, and a concession was given to an American company for the development of the Chiatura fields. When this concession proved unsuccessful, the work was turned over to a government trust organized for the purpose, known as "Chiatura manganese industry." When the trust took over the enterprise from the concessionary, only one of the 35 plants was working.

During the 13 months the new trust has been in operation 19 mines have been restored, from which 1,230,672 tons of ore has been procured. The number of workers has increased from 450 to 9500. Exports have increased from 80,000 to 90,000 tons a month, as against 23,360 tons exported in August, 1928. According to the five-year plan, the output of manganese is to be increased to 1,300,000 tons of washed manganese and 300,000 tons of ordinary ore in 1932-33.

German Tariff Extended

WASHINGTON, Jan. 6.—The present German tariff schedule, which was to have expired Dec. 31, has been extended indefinitely, according to a cablegram received by the Department of Commerce from Berlin.

Exports 6½ Per Cent Ahead of 1928

Principal Gains Made in Structural Shapes, Bars, Plates and Pipe—Imports of Rolled and Finished Steel Off 21 Per Cent

WASHINGTON, Dec. 27.—Exports of iron and steel products from the United States during the first 11 months of 1929 aggregated 2,817,110 gross tons, indicating a 12-month total well above 3,000,000 tons, the highest since 1920, when exports were 4,927,800 tons. Exports during the 11 months of 1929 were 174,198 tons in excess of those in the corresponding period of 1928. The total of 2,642,912 tons was only 45,687 tons below the 2,862,997 tons in the entire year 1928, which had the largest total since 1920. The unusually heavy shipments in 1920 were due to the fact that European producers were in a state of transformation from war to peace activities and struggling to recover their world markets.

Exports in November, totaling 241,829 tons, were 5817 tons less than the 247,646 tons in October, and 16,247 tons below those in November, 1928.

In contrast to the outgoing movement, imports in 1929 reflected a decrease under 1928. In the first 11 months they were 691,433 tons, or 35,877 tons less than the 727,310 tons in the like period of 1928. Assuming that the monthly average of the year was maintained in December, the total for 1929 would be 754,000 tons, or nearly 30,000 tons less than the incoming shipments of 782,694 tons in 1928.

Imports in November were 54,041 tons, 9185 tons less than the 63,226 tons in October, and 16,716 tons under those in November, 1928. The decline in imports to the United States in the face of tariff revision apparently signifies lack of apprehension abroad over the forthcoming change in rates, or inability to penetrate the domestic markets more extensively, despite the active demand during the greater part of 1929. Unlike iron and steel imports, there was a rather sharp increase in incoming shipments of some machinery lines, especially machine tools, in 1929.

Analysis of exports for the first 11 months discloses how closely American manufacturers have maintained their two leading markets, those of Canada and Japan, as well as the high percentage of exports to the former country. In 1929 shipments to Can-

Exports of Iron and Steel from the United States

(In Gross Tons)

	November		11 Months Ended November	
	1929	1928	1929	1928
Pig iron	678	12,177	44,734	76,268
Ferromanganese	103	423	1,491	7,858
Scrap	55,565	16,306	495,899	479,831
Pig iron, ferroalloys and scrap	*56,346*	*28,906*	*542,124*	*563,957*
Ingots, blooms, billets, sheet bar	10,917	3,716	44,794	28,475
Skelp	17,499	24,407	129,339	127,868
Wire rods	2,518	3,251	39,194	35,787
Semi-finished steel	*30,934*	*31,374*	*213,327*	*192,130*
Steel bars	9,940	18,409	181,755	143,538
Alloy steel bars	744	1,054	14,367	13,372
Iron bars	397	1,959	3,853	5,042
Plates, iron and steel	16,698	21,515	182,390	147,533
Sheets, galvanized	7,701	12,727	142,455	138,521
Sheets, black steel	10,352	11,744	161,417	166,520
Sheets, black iron	1,337	1,669	14,750	14,835
Hoops, bands, strip steel	4,634	4,981	65,546	52,468
Tin plate; terne plate	16,781	28,683	234,443	232,335
Structural shapes, plain material	25,465	27,755	258,255	185,718
Structural material, fabricated	10,973	10,392	106,387	83,209
Steel rails	12,342	6,870	139,200	178,791
Rail fastenings, switches, frogs, etc	2,425	2,148	29,660	38,755
Boiler tubes	1,474	2,037	17,555	17,357
Casing and oil line pipe	4,265	12,410	110,042	111,914
Black and galvanized pipe	9,448	8,037	130,659	103,239
Plain wire	2,814	4,357	42,354	43,596
Barbed wire and woven wire fencing	3,461	7,476	60,066	68,964
Wire cloth and screening	123	173	1,579	1,681
Wire rope	316	461	6,584	4,757
Wire nails	604	844	12,081	13,540
Other nails and tacks	945	818	9,614	9,013
Horseshoes	56	45	431	420
Bolts, nuts, rivets and washers, except track	1,058	1,588	14,756	12,421
Rolled and finished steel	*145,191*	*188,984*	*1,940,199*	*1,796,614*
Cast iron pipe and fittings	4,724	3,323	42,151	31,166
Car wheels and axles	1,606	1,427	20,283	14,570
Malleable iron screwed pipe fittings	838	832	11,282	9,075
Iron castings	747	790	10,279	10,366
Steel castings	646	707	10,321	8,581
Forgings	711	976	11,387	10,882
Castings and forgings	*9,272*	*8,955*	*105,703*	*84,640*
All other	924	1,589	15,757	14,646
Total	241,829	258,076	2,817,110	2,642,912

Imports of Iron and Steel into the United States

(In Gross Tons)

	November		11 Months Ended November	
	1929	1928	1929	1928
Pig iron	12,702	10,934	130,591	129,819
Ferromanganese*	4,654	5,177	59,416	43,893
Ferrochrome†	20	25	597	659
Ferrosilicon‡	552	773	8,973	3,510
Scrap	6,843	9,175	88,705	56,766
Pig iron, ferroalloys and scrap	*24,771*	*26,084*	*288,282*	*234,647*
Steel ingots, blooms, billets and slabs	944	1,599	24,789	20,223
Wire rods	1,364	1,892	14,614	14,970
Semi-finished steel	*2,308*	*3,491*	*39,403*	*35,193*
Rails and splice bars	321	452	6,387	14,491
Structural shapes	11,961	11,806	139,913	153,661
Boiler and other plates	133	1,159	3,243	7,918
Sheets and saw plates	1,652	816	22,678	21,510
Steel bars	3,445	6,399	35,414	82,124
Bar iron	57	654	2,613	2,335
Hoops, bands and cotton ties	2,513	5,409	40,498	50,140
Tubular products (wrot.)	3,767	4,782	37,501	41,091
Nails, tacks, staples	591	1,126	8,390	9,337
Tin plate	10	6	267	871
Bolts, nuts, rivets and washers	17	5	355	227
Round iron and steel wire	320	423	5,349	4,259
Barbed wire	519	1,111	5,455	4,804
Flat wire; strip steel	171	305	2,021	2,307
Steel telegraph and telephone wire	7	....	26	173
Wire rope and strand	169	147	2,327	1,519
Other wire	30	183	435	684
Rolled and finished steel	*25,713*	*34,783*	*312,872*	*397,451*
Cast iron pipe	1,140	6,113	49,099	57,265
Castings and forgings	109	286	1,777	2,754
Total	54,041	70,757	691,433	727,310
Manganese ore*	23,598	16,645	308,633	189,444
Iron ore	268,876	223,144	2,853,279	2,280,247
Magnesite	5,990	8,448	44,217	46,839

*Manganese content only.
†Chromium content only.
‡Silicon content only.

ada were 1,166,451 tons, or 41.4 per cent of the total, while in 1928 they amounted to 1,090,592 tons, or 41.2 per cent of the total. In 1929 exports to Japan were 373,417 tons, or 13.2 per cent of the total, while in the corresponding period of 1928 they were 374,289 tons, or 14.1 per cent of the total.

Combined, exports to Canada and Japan in the first 11 months of 1929 represented 54.6 per cent of the total, compared with 55.3 per cent in 1928. Exports to Canada in November amounted to 102,524 tons, against 107,091 tons in October and 122,291 tons in November, 1928. Exports to Japan in November were 42,550 tons, compared with 43,100 tons in October and 23,996 tons November, 1928.

Among the more important increases in exports in the first 11 months of 1929 were scrap, which rose to 495,899 tons from 479,831 tons; ingots, blooms, billets and sheet-bar rising to 44,794 tons from 28,475 tons; steel bars rising to 181,755 tons from 143,538 tons; plates rising to 182,390 tons from 147,533 tons; plain structural material rising to 258,255 tons from 185,718 tons; fabricated shapes rising to 106,387 tons from 83,209 tons; black and galvanized welded pipe rising to 130,659 tons from 103,239 tons.

Principal declines in exports during the first 11 months were pig iron, dropping to 44,734 tons from 76,268 tons, and steel rails, decreasing to 139,200 tons from 178,791 tons.

Scrap represented the largest export item in November, Japan taking 32,355 tons of the total of 55,565 tons; Canada, 8323 tons; Italy, 5989 tons, and Spain, 4281 tons. The second largest item was plain structural material, shipments to Canada amounting to 20,577 tons; to Chile, 2667 tons, and to Brazil, 782 tons. Of the 16,781 tons of tin plate exported in November 3402 tons went to Canada, 3027 tons to British India, 2850 tons to Japan, 2021 tons to China and 1226 tons to Mexico.

Canada was the destination of 14,233 tons of the 16,698 tons of plates exported in November, while Chile took 6584 tons of the steel rail exports, the Philippine Islands taking 1825 tons; Brazil, 1219 tons, and Canada, 1016 tons. Canada took 5474 tons and the United Kingdom 1761 tons of the 9940 tons of steel bars exported. Of the 6616 tons of black welded pipe exported in November, Japan took 1524 tons; Canada, 777 tons; Mexico, 746 tons, and the United Kingdom, 720 tons. Casing and oil line exports in November were 4265 tons, of which 1696 tons went to Venezuela and 1299 tons to Canada.

Belgium was the source of the largest amount of imports in November, supplying 10,410 tons. Germany supplied 9218 tons; Canada, 9010 tons; India, 7053 tons (all pig iron); and the United Kingdom, 6473 tons. The largest import item in November was pig iron, 12,702 tons, of which the major portion came from India.

Of the 11,961 tons of structural material imported, 6101 tons came from Belgium, 3625 tons from Germany, and 1956 tons from France. Of the 4654 tons of ferromanganese imported, 1654 tons came from Canada, 1340 tons from the United Kingdom and 1198 tons from Italy. Sweden supplied 1247 tons of the 3445 tons of steel bars imported in the month, while 1156 tons came from Belgium and 487 tons from Germany.

Of the 23,598 tons of manganese ore imported in November, 12,430 tons came from Soviet Russia, 5218 tons from the Gold Coast of Africa, 3264 tons from Brazil, and 2080 tons from India.

UNITED STATES IMPORTS OF IRON AND STEEL PRODUCTS

(In Gross Tons)

	Nov.	Oct.	Sept.
Austria	1	89	17
Belgium	10,410	11,374	13,238
Czechoslovakia	53	38	98
Denmark	5	....	....
France	4,768	6,272	8,756
Germany	9,218	8,400	10,933
Italy	601	393	345
Netherlands	675	585	791
Norway	1,408	4,294	460
Sweden	4,043	2,810	3,063
Switzerland	4	30	19
United Kingdom	6,473	1,950	3,791
Europe	*37,659*	*36,226*	*41,511*
Mexico	....	69	30
Canada	9,010	18,082	12,917
Panama	41	....	....
Cuba	228	....	....
British India	7,053	8,846	6,485
China	44	....	....
Japan	6	2	7
Miscellaneous	....	1	24
Total	54,041	63,226	60,974

Destination of Iron and Steel Exports from the United States

(In Gross Tons)

Country of Destination	November, 1929	October, 1929	November, 1928	January Through November 1929	January Through November 1928
North and Central America and West Indies	*130,979*	*121,517*	*149,292*	*1,421,253*	*1,313,689*
Canada and Newfoundland	102,926	97,309	122,358	1,169,066	1,093,422
Cuba	5,027	6,101	6,579	63,714	60,076
Guatemala	580	876	892	7,089	7,052
Honduras	444	683	1,101	9,147	6,415
Mexico	7,090	11,484	8,335	96,445	75,851
Panama	1,481	1,985	2,009	18,308	15,725
Salvador	363	708	146	6,525	3,070
British West Indies	684	1,114	698	16,806	7,232
Other West Indies	1,349	1,209	6,723	24,810	35,627
Other Central America	1,025	998	551	9,343	8,019
South America	*30,524*	*31,105*	*13,299*	*362,718*	*104,708*
Argentina	4,526	8,278	9,529	84,408	91,817
Brazil	4,870	7,979	8,641	65,504	78,433
Chile	14,296	5,515	7,176	64,020	65,746
Colombia	1,507	3,409	6,722	38,288	60,757
Peru	1,503	1,982	2,039	33,440	24,424
Uruguay	175	2,445	970	9,180	8,328
Venezuela	3,209	1,197	7,940	62,330	70,763
Other South America	638	500	282	5,548	4,420
Europe	*21,413*	*19,371*	*11,862*	*336,033*	*262,376*
Belgium	41	108	138	2,469	13,312
France	529	1,118	760	17,476	5,948
Germany	859	2,992	1,310	21,997	22,492
Italy	6,182	5,453	989	103,107	86,206
Netherlands	91	264	309	2,763	2,121
Poland and Danzig	7	10	3,186	75,098	56,965
Rumania	241	119	264	3,779	4,170
Soviet Russia	2,523	912	59	11,070	2,750
United Kingdom	5,224	5,704	5,360	62,726	49,805
Other Europe	5,706	4,691	2,487	35,548	18,886
Far East	*66,211*	*65,711*	*49,393*	*670,877*	*650,262*
British Malaya	576	955	746	9,081	6,229
China	3,559	3,588	6,212	64,217	88,063
Netherlands East Indies	2,669	3,359	3,457	57,388	37,564
India and Ceylon	3,543	1,568	4,689	20,124	24,668
Japan	42,550	43,100	23,996	373,417	374,289
Kwantung	1,628	294	675	11,204	13,840
Philippine Islands	7,023	8,937	6,168	92,868	77,291
Australia	1,844	1,557	1,962	20,814	15,225
New Zealand	471	907	24	5,069	2,002
Other Asia and Far East	2,348	1,449	1,464	16,695	11,091
Africa	*2,472*	*6,639*	*1,180*	*26,229*	*12,277*
Union of South Africa	385	655	701	7,800	5,755
Egypt	1,579	5,724	208	13,591	3,669
Mozambique	72	128	74	2,856	1,165
Other Africa	436	132	147	1,982	1,688
Total	241,829	247,646	258,076	2,817,110	2,642,812

Industrial Coal Stocks About Stationary

Stocks of anthracite and bituminous coal, on hand in industries of the United States and Canada on Dec. 1, are reported by the National Association of Purchasing Agents at 37,512,000 net tons, compared with 37,313,000 tons Nov. 1. There has been a steady increase since the low figure of 31,282,000 tons June 1, but the recent figure is well below that of Dec. 1, 1928, when stocks stood at 41,010,000 tons.

It is estimated that the bituminous stocks in industrial hands are sufficient for about 27 days' operation, on the average, at current rates of activity. These vary, however, with different industries. Steel mills have 27 days' supply; by-product coke plants, 29 days'; electrical utilities, 51 days'; coal gas plants, 78 days'; railroads, 20 days'; other industries, 25 days'.

Machinery Exports in New High Record

Eleven-Month Total Far Above Any Earlier Calendar Year—24 Per Cent Ahead of 1928—Imports Up 43 Per Cent

WASHINGTON, Dec. 28.—Reflecting a decline of $5,646,822, exports of machinery of all kinds in November were valued at $47,541,581, against $53,188,403 in October. But for the first 11 months of 1929 they increased by $109,943,131 to $563,132,287, those for the corresponding period of 1928 being valued at $453,189,156. In November, 1928, they were valued at $44,538,465.

Outgoing shipments of machinery and vehicles in November were valued at $77,141,260, against $90,053,421 in October. For the first 11 months of 1929 they aggregated a value of $1,122,174,151, an increase of $168,311,111 over similar exports, valued at $953,863,036, for the corresponding period of 1928.

Exports of industrial machinery are reported by the Division of Statistics, Department of Commerce, at $21,886,828 in November, against $24,090,870 in October. For the first 11 months of 1929 they were valued at $256,251,767, compared with $204,960,578 for the like period of 1928. In November, 1928, they were valued at $21,873,594.

Exports of power-driven metal-working machinery in November were valued at $2,902,793, against $2,718,610 in October. For the first 11 months of 1929 they were valued at $30,772,565.

Exports of metal-working machinery listed in THE IRON AGE table totaled 690 units, valued at $1,424,560, in November, compared with 973, valued at $1,386,312, in October.

Imports of machinery and vehicles in November were valued at $2,615,122, against $3,636,532 in October. For the first 11 months of 1929 they were valued at $38,756,861, against $26,755,295 for the corresponding period of 1928.

Imports of machinery listed in THE IRON AGE table were valued at $1,796,844 in November, against $2,648,455 in October. For the first 11 months of 1929, they were valued at $28,001,606, an increase of $8,467,021 over the corresponding period of 1928, valued at $19,534,585.

Imports of industrial, office and printing machinery in November were valued at $1,768,253, compared with $2,544,436 in October. For the first 11 months of 1929 they were valued at $22,960,841, against $16,649,618 for the corresponding period of 1928. In November, 1928, they were valued at $1,718,213.

Machinery Exports from the United States

(By Value, in Thousands of Dollars)

	November		11 Months Ended November	
	1929	1928	1929	1928
Locomotives	$871	$455	$4,036	$3,171
Other steam engines	29	51	782	824
Boilers	116	208	1,866	1,339
Accessories and parts	92	62	918	589
Automobile engines	208	496	10,937	12,439
Other internal combustion engines	868	788	7,233	8,132
Accessories and parts	298	233	3,989	3,232
Electric locomotives	334	79	941	1,236
Other electric machinery and apparatus	1,048	811	12,284	7,382
Excavating machinery	723	458	7,548	6,928
Concrete mixers	76	109	1,326	1,012
Road-making machinery	128	115	2,977	2,014
Elevators and elevator machinery	372	564	4,967	5,509
Mining and quarrying machinery	1,255	1,316	16,494	12,549
Oil-well machinery	1,520	1,475	23,001	14,371
Pumps	865	662	7,243	5,365
Bending and power presses	270	320	3,069	2,567
Forging machines	367	154	1,603	871
Machine tools*	2,092	1,331	25,917	14,508
Other metal-working machinery and parts	535	757	6,852	5,987
Textile machinery	1,241	1,104	12,265	11,790
Sewing machines	668	727	9,557	7,856
Shoe machinery	188	141	1,801	1,619
Flour-mill and gristmill machinery	62	109	608	487
Sugar-mill machinery	390	622	4,262	4,491
Paper and pulp-mill machinery	470	289	3,734	2,860
Sawmill machinery	124	85	863	854
Other woodworking machinery	232	226	2,224	1,875
Refrigerating and ice-making machinery	692	1,028	13,394	8,748
Air compressors	555	531	7,127	6,230
Typewriters	1,689	1,854	21,411	19,152
Power laundry machinery	216	154	1,916	1,134
Typesetting machines	428	479	5,320	4,368
Printing presses	439	599	6,056	5,659
Agricultural machinery and implements	8,345	7,850	128,523	107,780
All other machinery and parts	19,736	18,297	200,988	158,270
Total	$47,542	$44,539	$563,132	$453,189

*Details of principal items in another table.

Imports of Machinery into the United States

(By Value)

	November		11 Months Ended November	
	1929	1928	1929	1928
Metal-working machine tools	$129,459	$39,015	$1,334,138	$506,814
Agricultural machinery and implements	387,297	308,234	8,315,023	4,383,041
Electrical machinery and apparatus	91,706	152,068	1,222,558	1,461,111
Other power-generating machinery	85,950	283,877	1,089,236	856,943
Other machinery	840,175	869,432	11,109,712	9,209,584
Vehicles, except agricultural	262,257	436,368	4,930,939	3,117,092
Total	$1,796,844	$2,088,994	$28,001,606	$19,534,585

Exports of Power-Driven Metal-Working Machinery

	November, 1929		October, 1929	
	No.	Value	No.	Value
Engine lathes	37	$66,622	100	$227,454
Turret lathes	45	107,572	28	101,257
Other lathes	63	125,783	82	181,306
Vertical boring mills and chucking machines	14	44,517	6	22,505
Thread-cutting and automatic screw machines	85	143,472	102	145,605
Knee and column-type milling machines	67	154,738	58	122,461
Other milling machines	59	193,208	41	107,725
Gear-cutting machines	19	60,526	31	88,693
Vertical drilling machines	18	27,589	26	26,381
Radial drilling machines	24	38,972	8	26,567
Other drilling machines	42	43,214	228	51,584
Planers and shapers	32	74,854	22	46,489
External cylindrical grinding machines	70	172,507	124	116,673
Internal grinding machines	22	86,522	53	82,978
Metal-working tool-sharpening machines	93	84,464	64	38,634
Total	690	$1,424,560	973	$1,386,312

Machinery Markets and News of the Works

Machine Tool Inquiry Good

Orders Are Few But Business in Prospect Is in Satisfactory Volume

A FAIRLY large volume of inquiries for machine tools is being figured on at the beginning of the new year, and it is likely that orders will result as soon as improvement in the general business situation is in greater evidence.

Orders for tools thus far in the year are comparatively few, but the last week of December brought quite a bit of business that had been pending for some time. For some dealers and machine tool builders December was quite a satisfactory month.

Most of the current buying is confined to lots of one to three tools. The A. O. Smith Corporation, Milwaukee, is making purchases against a list. The Allis-Chalmers Mfg. Co., Milwaukee, is in the market for a few items and may issue a larger inquiry.

Machine tool builders have sufficient orders on their books to last fairly well through the first quarter. They are optimistic that business will soon show an upturn.

New York

NEW YORK, Jan. 9.—Activity in the Eastern machine tool markets is represented by a large volume of quotations, but orders have been slow since Jan. 1. However, the amount of buying in the last two weeks of 1929 was surprisingly good. One house closed orders for about $60,000 in New England alone on the two last days of the old year. Although the nearby prospects for machine tools are still somewhat uncertain and depend no doubt to a large extent on the recovery of business generally, machine tool sellers regard the outlook for the entire year as decidedly encouraging. They base this expectation on the fact that most industrial corporations are prosperous, and that they will not hesitate long in purchasing equipment that will reduce costs and thereby place them in a better position to meet the more severe competition which may be expected this year.

Continental Can Co., 1 Pershing Square, New York, has awarded general contract to Mahony-Troast Construction Co., 38 Broadway, Passaic, N. J., for one-story addition to plant at Passaic, 50 x 110 ft., to cost about $25,000 with equipment. Francisco & Jacobus, 511 Fifth Avenue, New York, are architects.

Dock Department, Pier A, North River, New York, has authorized construction of eight steel hangars with lean-to extensions at Floyd Bennett municipal airport, Barren Island, to include reconditioning and repair facilities, to cost $1,050,000. Michael Cosgrove is dock commissioner; T. F. Keller is chief engineer.

J. Renz & Co., 568 Washington Street, New York, operating a welding and machine works, have leased building at 325 West Houston Street for expansion.

M. W. Del Gaudio, 545 Fifth Avenue, New York, architect, has plans for a one-story automobile service, repair and garage building, to cost about $125,000 with equipment.

United Dry Docks, Inc., 11 Broadway, New York, has plans for a one-story foundry and mechanical shop at Port Richmond, to cost about $75,000 with equipment.

Standard Oil Co. of New Jersey, Inc., 26 Broadway, New York, is planning storage and distributing plant on waterfront at Kreischerville, S. I., to cost over $100,000 with equipment.

Board of Trustees, Home for Incurables, Third Avenue and 181st Street, New York, has filed plans for six-story power plant, to cost $300,000 with equipment. Crow, Lewis & Wick, 200 Fifth Avenue, are architects.

Board of Education, Tuxedo Park, N. Y., is considering installation of manual training equipment in senior and junior high school to cost more than $350,000, for which plans will be drawn by Guilbert & Betelle, 24 Branford Place, Newark, N. J., architects.

Municipal Sanitation Commission, Municipal Building, New York, William Schroeder, Jr., chairman, is planning construction of 19 refuse incinerator plants, each of about 500 tons capacity during 1930, five in Manhattan, to cost $8,500,000 with machinery; five for Queens Borough, $6,582,000; five in Brooklyn, to cost $7,200,000; and four in Bronx, $6,200,000. It is also proposed to construct nine automobile service, repair and garage buildings for trucks, to cost about $2,000,000 with equipment.

General Electric Co., Schenectady, N. Y., has awarded general contract to T. J. Pardy Construction Co., 1481 Seaview Avenue, Bridgeport, Conn., for five-story factory branch and distributing plant, 28 x 195 ft., at Bridgeport, to cost about $100,000 with equipment.

Topping Brothers, Inc., 159 Varick Street, New York, manufacturer of marine and other heavy hardware, will soon begin superstructure for addition to seven-story plant, including improvements in present unit, to cost about $300,000. Russell G. Cory, 30 Church Street, is architect and engineer.

Department of Water Supply, Gas & Electricity, Municipal Building, New York, will soon take bids for equipment storage and distributing plant, and automobile service, repair and garage building at West New Brighton, S. I., to cost about $450,000 with equipment. Sibley & Fetherston, 205 East Forty-second Street, are architects.

Positive Lock Washer Co., Avenue A, Newark, has awarded general contract to W. J. MacEvoy Construction Co., 85 Academy Street, for two-story addition, to cost over $40,000 with equipment. Raymond B. Flatt, 600 Bloomfield Avenue, Bloomfield, N. J., is architect.

Berry Electric Service Co., Newark, manufacturer of electrical supplies, with vacuum cleaner repair division, etc., has leased building at 43 William Street, totaling 6000 sq. ft. floor space, for new plant.

Sinclair Refining Co., 45 Nassau Street, New York, is planning oil storage and distributing plant near Linden, N. J., to cost more than $150,000 with equipment.

Cooper Hewitt Electric Co., 410 Eighth Street, Hoboken, N. J., manufacturer of vapor lighting equipment for industrial service, mercury switches, etc., a subsidiary of General Electric Co., has arranged for change of name to General Electric Vapor Lamp Co., and will carry out expansion.

Wallace & Tiernan Co., 11 Mill Street, Belleville, N. J., manufacturer of chlorine control apparatus, has engaged Fletcher-Thompson, Inc., 738 Broad Street, Newark, and 542 Fairfield Avenue, Bridgeport, Conn., architect and engineer, to prepare plans for addition on adjoining land recently acquired, to cost more than $85,000 with equipment.

Israel Max & Sons, Inc., 660 Grand Street, Jersey City, N. J., plan rebuilding part of millwork plant destroyed by fire Jan. 1 with loss reported more than $125,000 including equipment.

Board of Education, 651 Broadway, Bayonne, N. J., J. J. Nealon, president, is considering construction of new technical high school, to cost over $1,000,000 with equipment, and will have plans drawn at early date.

Francis P. Friedman, 395 Springfield Avenue, Newark, architect, has plans for a one-story automobile service, repair and garage building, 135 x 150 ft., at Passaic, N. J., to cost about $125,000 with equipment.

Franklin Hardware Co., New York, machine shop supplies, will move after

Jan. 18 from 37 Howard Street to 50-52 Franklin Street.

Oppel, Glanfield & Rowe, Inc., distributer of factory supplies and hardware, has leased space in a building at Hamilton and McWorter Streets, Newark, N. J. Mr. Oppel was formerly general manager of Banister & Pollard, Newark.

New England

BOSTON, Jan. 6.—Activities of machine tool dealers are confined largely to old inquiries. The majority of metal-working plants have finished their inventories and are now operating on full weekly schedules, but with a smaller payroll than on Oct. 1. Electrical apparatus manufacturers, airplane and machine tool builders are well booked ahead and automobile parts manufacturers are beginning to receive new business. Textile machinery, heater and radio manufacturers generally are quiet. New inquiries are in fair volume.

United Electric Light Co., Springfield, Mass., has plans for a one-story substation, to cost $300,000 with equipment.

A. F. Robinson Boiler Works, East Cambridge, Mass., has closed bids for a one-story addition, 42 x 195 ft.

Robertson Paper Box Co., Montville, Conn., will soon award a general contract for a plant addition requiring miscellaneous equipment.

New England Smelting Works, Inc., West Springfield, Mass., has started work on a plant to replace one recently destroyed by fire. New equipment is required.

J. M. Tatem Handle Co., Putnam, Conn., has begun work on a two-story plant, 40 x 128 ft., to replace one recently destroyed by fire.

Manual training departments are included in a $350,000 junior high school contemplated by South Norwalk, Conn., bids for which close Jan. 14.

G. & O. Mfg. Co., 138 Winchester Avenue, New Haven, Conn., manufacturer of automobile radiators, has awarded general contract to New England Construction Co., 511 Chapel Street, for two-story and basement addition, 40 x 100 ft., to manufacture radiators for aircraft, to cost about $45,000 with equipment. Westcott & Mapes, 139 Orange Street, are architects and engineers.

Maine Seaboard Paper Co., recently formed by Walter S. Wyman, president of Maine Central Power Co., 317 Water Street, Augusta, Me., and associates, has awarded general contract to Morton G. Tuttle Co., 31 St. James Avenue, Boston, for new newsprint mill near Vernona Island, Bucksport, Me., to cost over $5,000,000 with machinery. Order has been placed with Rice, Barton & Fales Co., Worcester, Mass., for two paper-making machines, and contracts for other equipment will be placed soon. Mr. Wyman is president of new company. George F. Hardy, 309 Broadway, New York, is engineer.

New Haven Gas Light Co., New Haven, Conn., is planning expansion program to cost $632,000. H. L. Sterrett is manager.

American Mineral Products Co., Inc., 983 Main Street, Hartford, Conn., will proceed with superstructure for a new one-story feldspar grinding mill, 36 x 200 ft., at Walpole, N. H., to cost more than $85,000 with crushing, conveying and other machinery. Walter Furey is company engineer.

The Crane Market

INQUIRY for overhead traveling cranes since the holidays has been limited to a few requests for estimates to be used in making appropriations. A number of substantial inquiries are in the market, however, and prospective buyers show no inclination to postpone buying. In the locomotive crane field, contractors in the New York district have been asking for quotations, and Stevens & Wood, Inc., 60 John Street, New York, engineers, are inquiring for a locomotive crane for use in the South. Recent purchases have included two 25-ton and one 50-tone locomotive cranes for Chile, bought by the Anglo-Chilean Consolidated Nitrate Corporation, New York, from the Browning Crane Co., and a 7½-ton locomotive crane bought by the D. M. W. Contracting Co., Brooklyn, from the Browning Crane Co.

J. W. Greer Co., 110 Windsor Street, Cambridge, Mass., manufacturer of bakers' and confectioners' machinery, has awarded general contract to Tredennick-Billings Co., 10 High Street, Boston, for two-story addition, 75 x 500 ft., to cost over $125,000 with equipment.

Southern New England Telephone Co., 157 Church Street, New Haven, Conn., has plans for one-story automobile service, repair and garage building, 100 x 200 ft., for company motor trucks and cars, at Bridgeport, Conn., to cost about $100,000, with equipment.

Philadelphia

PHILADELPHIA, Jan. 6.—Ford & Kendig Co., 1428 Callowhill Street, Philadelphia, manufacturer of steam specialties, is contemplating new one and two-story plant, to cost over $500,000 with machinery.

Crane Co., 212 South Thirteenth Street, Philadelphia, manufacturer of plumbing and heating equipment, with headquarters at Chicago, has awarded general contract to Ketcham & McQuade, 1020 Brown Street, for factory branch and distributing plant, to cost about $75,000 with equipment. Stearns & Woodnutt, Stephen Girard Building, are architects.

Fisher Body Service Corporation, General Motors Building, Detroit, affiliated with Fisher Body Co., same address, has leased building at 3319 North Broad Street, Philadelphia, as a school for instruction of mechanics; equipment will be installed at once.

Electric Service Supplies Co., Seventeenth and Cambria Streets, Philadelphia, will soon take bids for an addition, to cost more than $50,000 with equipment. Conrad F. Neff, Twelfth and Locust Streets, is architect.

Philadelphia Electric Co., Ninth and Sansom Streets, Philadelphia, is arranging an expansion and improvement program to cost $26,400,000, including additional power facilities, construction of steel tower transmission lines, power switching and substations, etc. Company engineering department will be in charge.

Montgomery Paving Co., 4 South Fifteenth Street, Philadelphia, is planning an aggregate mixing, storage and distributing plant, with boiler house, to cost over $70,000 with machinery.

Aircraft Engine Corporation, Camden, N. J., care of Ludington Management, Inc., Camden, has plans for new one-story factory, 75 x 150 ft., to manufacture airplane engines and parts, to cost about $35,000 with equipment. Parts and assembling divisions will be provided.

James G. Kean, operating a boat-building and repair plant at Camden, N. J., has acquired a 4-acre tract near Barnegat, N. J., for new plant. Present works will be removed to new location and capacity increased.

Board of Commissioners of Delaware County, Court House, Media, Pa., has plans for power house at Concord, Pa., for central steam-heating, to cost over $65,000 with equipment. George S. Idell, Corn Exchange Building, Philadelphia, is architect and engineer.

Safe Harbor Power Corporation, recently organized by officials of Pennsylvania Water & Power Co., Holtwood, Pa., with headquarters in Lexington Building, Baltimore, is arranging early construction of hydroelectric generating plant at Safe Harbor, Pa., on Susquehanna River. New plant will have initial capacity of 235,000 hp., and will cost about $30,000,000, including steel tower transmission lines to connect with present high-tension system of parent organization. Engineering department of company is in charge.

Department of Property and Supplies, Capitol Building, Harrisburg, Pa., B. E. Taylor, secretary, will receive bids until Jan. 21 for quantity of maintenance hand tools. New bids will also be asked soon on revised plans for power house at East Stroudsburg, Pa., to cost about $49,000 with equipment.

American Pulley Co., 4200 Wissahickon Avenue, Philadelphia, manufacturer of pulleys and other transmission equipment, has acquired plant and business of Pacific Spruce Products Co., Tacoma, Wash., manufacturer of kindred products, and will consolidate. It is understood that operations will be discontinued at Tacoma.

South Atlantic

BALTIMORE, Jan. 6.—William J. Ogden, Union Trust Building, Baltimore, is at head of project to establish plant for manufacture of a patented voting machine. Building on Lexington Street, near Pine Street, has been leased for an assembling plant.

D. A. Stickell & Sons, Inc., Hagerstown, Md., is completing plans for rebuilding five-story flour mill and grain elevator, recently destroyed by fire, to cost $100,000. Hoisting, conveying, screening and other mechanical equipment will be installed. J. J. Klinkhart, Kohler Building, is architect.

Gaither Painting & Body Co., Statesville, N. C., recently formed by Martin J. Gaither, Statesville, and associates, with capital of $100,000, is planning early operation of local automobile body repair works. B. B. Kerr, Statesville, is also interested in company.

Washington Railway & Electric Co., Fourteenth and C Streets, N. W., Washington, will soon take bids on general contract for two-story automobile service, repair and garage building, to cost $375,000 with equipment. A. B. Heaton, 1211 Connecticut Avenue, N. W., is architect.

Washington Airport Corporation, National Press Building, Washington, has plans for two hangars, 100 x 120 ft., and 50 x 115 ft., with repair and reconditioning facilities, at local airport, and administration building, to cost about $100,000 with equipment.

Board of District Commissioners, Dis-

trict Building, Washington, is considering installation of manual training equipment in three-story Kingsman junior high school at Seventeenth Place and C Street, N. E., to cost $500,000, for which plans are being drawn by A. L. Harris, District Building, municipal architect.

St. Paul Garage Co., Redwood and Light Streets, Baltimore, W. B. Collins, president, will soon begin superstructure for seven-story service, repair and garage building, to cost $1,000,000 with equipment. Wyatt & Nolting, Keyser Building, are architects.

Peoples' Light & Power Corporation, 27 William Street, New York, is contemplating a hydroelectric generating plant in Patrick County, Virginia, to cost over $1,500,000 with transmission system.

Virginia Electric & Power Co., 700 East Franklin Street, Richmond, Va., is planning for expansion to cost about $6,000,000, including extensions in power stations, transmission lines and distributing system. Company is also arranging for early work on initial unit of hydroelectric power plant on Roanoke River, to cost over $4,000,000.

E. A. Bush, 226 Decatur Street, S. E., Atlanta, Ga., and associates plan construction of ice-manufacturing and refrigerating plant, to cost more than $75,000 with equipment. A company will be organized.

Consolidated Aircraft Corporation, 2050 Elmwood Avenue, Buffalo, has established branch assembling plant for flying boat production at Langley Field, Va., and has leased portion of army seaplane base for such purpose. Present capacity will be increased at early date.

R. W. Norris & Sons, 342 North Gay Street, Baltimore, automobile equipment and supplies, have plans for one-story machine and repair shop to cost about $25,000 with equipment. Owens & Sisco, Continental Building, are architects.

Pittsburgh

PITTSBURGH, Jan. 6.—The machinery business has developed no unusual activity as yet this month, but miscellaneous orders are being placed regularly and inquiry for individual items is in good volume. Absence of lists from large industrial buyers is reported by some dealers as being rather unusual, but a few items for the first quarter list of the Westinghouse Electric & Mfg. Co. have come out. The Pittsburgh Board of Education placed orders for a number of tools late in December. Railroad buying is still deferred and only a few tools for the carriers are being figured at this time.

Makers of heavy machinery and equipment are watching closely the development of several large steel mill expansion programs which were announced for this district late last year. While most of the projects will undoubtedly go forward, plans are apparently in the formative stage at this time, and not much activity is expected to result from this work until early spring.

Columbia Radiator Co., 3200 Walnut Street, McKeesport, Pa., manufacturer of radiators for domestic service, heaters, etc., has awarded general contract to Austin Co., Pittsburgh, for one-story plant unit, including foundry, machine shop, storage and distributing building, and other structures, to cost more than $200,000 with equipment. R. C. Painter is secretary.

Wolverine-Empire Refining Co., Oil City, Pa., has been organized to take over and consolidate Empire Oil Works, Inc., with refineries at Oil City and Tidioute, Pa., and Wolverine Lubricants Co., 51 Madison Avenue, New York. New company has authorized expansion and improvement program at Empire plants, with installation of additional equipment. E. W. Chase is chairman of board, and C. H. Ellingwood, president.

Times Square Garage Co., Tenth and Peach Streets, Erie, Pa., has plans for four-story addition to service, repair and garage building, 100 x 160 ft., to cost over $100,000 with equipment. Bids will be asked on general contract early in spring.

Richmond Radiator Co., Norristown, Pa., is planning for removal of local plant to Uniontown, Pa., where branch plant, including enameling works, heretofore has been operated. Production will be concentrated in future at Uniontown, where expansion will be carried out.

Equitable Gas Co., 435 Sixth Avenue, Pittsburgh, is planning expansion and improvement program to cost about $2,000,000, including development in natural gas resources, pipe line construction, booster stations and miscellaneous work.

Reliance Steel Castings Co., Twenty-eighth and Smallman Streets, Pittsburgh, has plans for one-story foundry addition, to cost about $60,000 with equipment. Lake & Davidson, Negley Building, are architects.

Board of Public Education, Administration Building, Pittsburgh, will receive bids until Jan. 16 for air compressor, vertical steel files, etc., for Clifford B. Connelley Trade School. H. W. Cramblet is secretary.

Buffalo

BUFFALO, Jan. 6.—Erie Railroad Co., 50 Church Street, New York, has awarded general contract to Peckham Construction Co., Crosby Building, Buffalo, for one-story shop unit at locomotive repair works at Hornell, N. Y., to cost about $125,000 with equipment.

East Branch Foundry, East Branch, N. Y., is planning to rebuild part of plant destroyed by fire Jan. 2. Company is operated by Walsh Casting Supply Co., 215 Montague Street, Brooklyn, N. Y.

Ernst Iron Works, Inc., Buffalo, recently organized by Frank C. Ernst, 53 Robie Avenue, and associates, with capital of $20,000, will operate local plant for production of architectural iron products. Elmer M. Ernst, 305 Walnut Street, is also interested in new company.

Arrow Head Steel Products Co., 89 Oak Street, Buffalo, is considering one-story forge shop and foundry at 180 Hopkins Street, to cost about $85,000 with equipment.

M. J. De Angelis, 49 East Avenue, Rochester, N. Y., architect, has asked bids on general contract for one-story automobile service, repair and garage building, to cost about $100,000 with equipment.

Following recent purchase of plant and business of General Airplanes Corporation, 618 Northumberland Avenue, Buffalo, at bankruptcy sale, plans are under way for organization of new company to take over and operate plant. Fred R. Shores will be president of new company; D. Falk Block, secretary-treasurer, Marine Metal & Supply Co., 167 South Street, New York, will be vice-president, and Harry Paltrowitz, president of last-noted company, will be secretary and treasurer.

Detroit

DETROIT, Jan. 6.—Chicago Pneumatic Tool Co., 6 East Forty-seventh Street, New York, has plans for two-story branch plant at Detroit, to cost over $60,000 with equipment. Van Leyan, Schilling & Keough, 3440 Cass Avenue, Detroit, are architects.

Detroit Street Railway Department, Administration Building, Shoemaker Street, has plans for a one-story power plant, to cost more than $75,000 with equipment.

Towner Hardware Co., 253 West Western Avenue, Muskegon Heights, will soon take bids on general contract for one and one-half story storage and distributing plant, to cost about $40,000 with equipment. E. E. Valentine, Union National Bank Building, Muskegon, is architect.

National Broach Co., Dayton, Ohio, has acquired 2-acre tract at Detroit, part of site now being improved with factory unit of about 15,000 sq. ft. floor space. It is understood that present works will be removed from Dayton and production concentrated in Detroit.

Board of Education, Lansing, has plans for new unit for Boys' Vocational School, to cost more than $80,000 with equipment. Bowd & Munson, Lansing, are architects.

New interests, headed by John A. Hacker and George G. Eddy, have taken over plant and business of Century Boat Co., Manistee. Company has been incorporated with capital of $100,000, and expansion in output is planned. Mr. Hacker is identified with boat-building plant of John L. Hacker, his father, at Mount Clemens.

Michigan Tank & Galvanizing Co., 14101 Prairie Avenue, Detroit, has plans for one-story unit, 150 x 400 ft., to cost about $175,000 with equipment.

Ford Motor Co., Detroit, has plans for new assembling plant at Richmond, Cal., on which work will begin early in spring. A 62-acre tract has been acquired, fronting on San Francisco Bay. Plant will consist of several one-story units, with power house, storage and other buildings, and will cost more than $750,000 with machinery.

Detroit Aircraft Corporation, Union Trust Building, Detroit, is removing plant of its subsidiary, Parks Airplane Co., St. Louis, to Detroit, where it will occupy part of former assembling plant of Studebaker Corporation. Capacity with be increased.

Commerce Pattern Foundry & Machine Co., 2211 Grand River Avenue, Detroit, has acquired property on Lafayette Boulevard for new plant, to cost about $50,000 with equipment. Work will begin early in spring.

Cleveland

CLEVELAND, Jan. 6.—Machine tool sales were light the past week and little new inquiry came out. However, a fair amount of business is in prospect in the form of inquiries that developed last month. In many cases prospective buyers announced that they would not make purchases until after the first of the year. Although December is usually a dull month in the machinery trade, some dealers, after tabulating their December sales, found that aggregate business for the month was very satis-

factory. No lists of any size are in prospect, most of the prospective business being in one or two tools.

Ohio Bolt & Nut Co., Berea, Ohio, has awarded general contract to Gilchrist Construction Co., Western Reserve Building, Cleveland, for one-story addition, 45 x 160 ft., to cost about $45,000 with equipment. John W. Bagley, 1706 Euclid Avenue, Cleveland, is architect.

Cleveland Steel Products Co., 7306 Madison Avenue, Cleveland, is considering one-story addition, to cost over $40,000 with equipment.

Firestone Battery Co., Akron, Ohio, manufacturer of electric storage batteries, is planning expansion and installation of additional equipment. Company is also arranging for a Pacific Coast plant, to cost more than $200,000 with machinery.

Timken Roller Bearing Co., Canton, Ohio, is considering one-story power plant at Bolivar, Ohio, to cost more than $50,000 with equipment.

Cleveland Electric Illuminating Co., Illuminating Building, Cleveland, is planning an expansion and improvement program to cost $18,000,000 including completion of new generating station on Lake Erie, near Ashtabula, Ohio, on which work has been started, extensions in steel tower transmission lines, power substations and distributing system.

Cleveland Commercial Auto Body Co., 1717 East Forty-fifth Street, Cleveland, is considering one-story addition, to cost about $50,000 with equipment.

Board of Education, Rocky River, Ohio, is considering installation of manual training equipment in new high school to cost about $200,000, for which plans will be drawn by Fulton & Taylor, 8120 Euclid Avenue, Cleveland, architects.

Milwaukee

MILWAUKEE, Jan. 6.—Only a few sales of machine tools were made during the holiday period, but the volume of inquiry was large and many transactions have been carried over into the new year. Disorganization of working schedules has created unusual activity in the metal working shops and the number of employees is considerably greater than on Dec. 1. Factory change-overs made necessary for the production of new or changed lines indicate an early demand for equipment.

Central Wisconsin Gas Co., 22 West Monroe Street, Chicago, has been granted a franchise to build a gas plant and distributing system at Waupaca, Wis. Jay S. Hart, 122 West Washington Avenue, Madison, Wis., is consulting engineer in charge.

Common Council, South Milwaukee, Wis., has engaged Perkinson & Dockendorff, architects, La Crosse, Wis., to design a new $75,000 vocational training school to replace building burned recently. Herman Daehling is secretary of board of vocational training.

Common Council, Racine, Wis., has authorized purchase of site for new municipal sewage disposal plant to cost about $1,700,000, work to begin about April 1. Plans are by Alvord, Burdick & Howson, consulting engineers, 8 South Dearborn Street, Chicago.

Board of Vocational Education, Racine, Wis., has awarded contracts for construction of new vocational school, three stories, 68 x 128 ft., to Bongard Construction Co., 1135 Mound Avenue, Racine.

Parker Pen Co., Janesville, Wis., has appointed Albert Kahn, Inc., architect, Detroit, Mich., to prepare plans for additions and remodeling of part of plant at cost of $78,000.

Magnetic Mfg. Co., 275 Twenty-third Ave., Milwaukee, manufacturer of magnetic separators, has let contract for an additional story to old building and for a shop addition, 25 x 34 ft., to Meredith Brothers Co., 253 Washington Street, Milwaukee.

Milwaukee Flush Valve Co., 125 Reservoir Avenue, will build a shop addition, 25 x 80 ft.

Common Council, New London, Wis., has granted franchise to Central Wisconsin Gas Co. to build a gas plant and distributing system.

Otto Biefeld Co., 202 North Water St., Watertown, Wis., has plans for erection of an additional shop to enlarge its structural steel fabrication department.

State Administrative Board, Lansing, Mich., is taking bids for addition to and remodeling of engineering building of Michigan College of Mining and Engineering, Houghton, Mich., to cost about $300,000. Derrick Hubert, Menominee, Mich., is architect.

Northern Conveyor & Mfg. Co., Janesville, Wis., manufacturer of mine conveyors, will increase its lines to include other mining machinery, snow plows, snow loading equipment, and flood control equipment, following enlargements made to plant last year. Additional plant facilities are also contemplated. George R. Whitnall is secretary-treasurer.

Milwaukee Stamping Co., Milwaukee, has acquired Litterer Brothers Mfg. Co. of Chicago. Manufacturing operations will be carried on at Milwaukee and an office and warehouse will be operated at Chicago.

Cincinnati

CINCINNATI, Jan. 6.—Fresh bookings by machine tool builders in this district were few the past two weeks. Orders were scattered and were mostly for one or two standard tools. Inquiry so far this year has been fairly brisk and manufacturers are optimistic concerning the immediate future. Unfilled orders on hand are sufficient to maintain capacity production through the first quarter.

The only sizable order placed recently was for three lathes by the Amtorg Trading Corporation, New York, with a local builder, for shipment to Russia.

William Powell Co., 2521-25 Spring Grove Avenue, Cincinnati, manufacturer of engineering specialties, valves, etc., has awarded general contract to Ferro Concrete Construction Co., Third and Elm Streets, for two-story addition, 61 x 95 ft., including improvements in present factory, to cost about $55,000 with equipment. Teitig & Lee, Merchants' Building, are architects.

Mengel Co., Eleventh and Dumesnil Streets, Louisville, manufacturer of automobile bodies, millwork products, etc., has awarded general contract to Platoff & Bush, First and Liberty Streets, for two-story addition, 50 x 400 ft., to cost about $75,000 with equipment. K. Strasser is company architect.

Owensboro Grain Co., Owensboro, Ky., plans rebuilding grain elevator and mill recently destroyed by fire. Installation will include drying machinery, hoisting and conveying equipment, screening machinery, etc. H. E. O'Bryan is president.

Duriron Co., Inc., East Monument Street, Dayton, Ohio, plans addition to laboratory and experimental plant, including foundry, machinery shop and other departments, to cost over $100,000 with equipment.

American Creosote Works, Inc., 1305 Dublin Street, New Orleans, has plans for a new plant near Jackson, Tenn., including power house, pumping station, conveying equipment, tram cars, etc., to cost more than $150,000 with machinery.

Traveling ovens, power machinery, conveying and other equipment will be installed in one, two and three-story plant, 150 x 160 ft., to be erected by Queen City Baking Co., Cincinnati, care of Hillsmith & Co., Chamber of Commerce Building, engineers, at Avondale, for which superstructure will soon begin, to cost $250,000.

Emery Industries, Inc., Saint Bernard, Ohio, will soon begin construction of power plant, to cost about $40,000 with equipment. Kinney & Ehlers, Dixie Terminal Building, Cincinnati, are engineers.

East Tennessee Light & Power Corporation, Bristol, Tenn., has been organized to take over and consolidate Bristol Gas & Electric Co., Bristol; Erwin Electric Light & Power Co., Erwin, Tenn., and six other similar utilities in this section. Consolidated organization plans expansion, including construction of transmission lines.

Chicago

CHICAGO, Jan. 6.—The beginning of the new year finds machine tool business in this district little changed from the situation near the close of December. It is still too early for the railroads to take definite action on 1930 lists, and dealers are turning attention to inquiries carried over from last year and fresh requests for prices which, from the number and character of equipment sought, are quite encouraging.

The used tool market is less active except for dealers who are building stocks of the better class of equipment. This is meeting with fair success in the absence of active buying by users.

A. O. Smith Corporation, Milwaukee, is making purchases against a list. Allis-Chalmers Mfg. Co., Milwaukee, is in the market for a few items for its tractor units and there is promise it will soon come out with a large list. Missouri-Kansas-Texas is inquiring for a 36-in. lathe.

Byllesby Engineering & Management Corporation, Chicago, will soon take bids for a $350,000 addition to electric generating station at Winnetka, Ill.

Commonwealth Edison Co., 72 West Adams Street, Chicago, will build a one-story substation, 66 x 100 ft., at 3250 North Narragansett Street. H. S. Henry Von Holst, 79 West Monroe Street, is architect.

Continental Scale Mfg. Co., 5701 Claremont Avenue, Chicago, has awarded general contract to Leopold Halper, 5956 South Washtenaw Avenue, for three-story plant unit to cost about $120,000 with equipment. George McClellan, 7441 Cottage Grove Avenue, is architect.

Mechanical Universal Joint Co., Ninth Street and Nineteenth Avenue, Rockford, Ill., will award general contract in about

30 days for three-story addition, 80 x 250 ft., to cost over $100,000 with machinery. Peterson & Johnson, Swedish-American Bank Building, are architects.

General Laundry Machinery Corporation, 1223 South Talman Avenue, Chicago, has purchased Paramount Laundry Machinery Corporation, 1501 Broadway, New York, and will consolidate. Present plants will be continued in service and expansion in output is planned. John Harriman, heretofore president of Paramount company, will become vice-president of General Laundry Machinery Corporation, of which L. F. Willey will continue as president.

Board of Education, 188 West Randolph Street, Chicago, has plans for a four-story technical school on Addison Street, to be known as Lane Technical School, to cost over $3,000,000 with equipment. Paul Gerhardt, 188 West Randolph Street, is architect.

Minnesota Valley Canning Co., Le Sueur, Minn., is contemplating early call for bids on general contract for addition to canning plant, including one-story power plant, to cost more than $400,000 with machinery. Ralph W. Richardson, 116 East Fourth Street, St. Paul, Minn., is engineer.

Bear Canon Coal Co., Trinidad, Colo., is planning to rebuild tipple at its Bear Canon mine, recently destroyed by fire, with loss of about $60,000 including equipment.

Van Sicklen Corporation, Elgin, Ill., manufacturer of automobile clocks and other automotive products, has purchased Lorraine Corporation, 341 East Ohio Street, Chicago, manufacturer of automobile driving light devices, etc., and will consolidate. It is purposed to continue present Lorraine plant in service and expand output.

Thompson & Jameson, Inc., 360 West Superior Street, Chicago, manufacturer of electric generator units for refrigeration service and other electrical equipment, has acquired adjoining two-story and basement factory, 70 x 130 ft., for expansion.

Pueblo Brass & Iron Foundry, Victoria Avenue and Greenwood Street, Pueblo, Colo., is planning expansion and installation of additional equipment.

Northwest Airways, Inc., Merchants' National Bank Building, St. Paul, Minn., has plans for buildings at St. Paul airport, including hangar, 130 x 200 ft.; machine shop, 30 x 200 ft.; administration building and other structures, to cost about $100,000 with equipment. C. H. Johnston, 360 Roberts Street, is architect. L. H. Brittin is vice-president and general manager.

Gulf States

BIRMINGHAM, Jan. 6.—City Council, Birmingham, is arranging special election in February to vote bonds for $1,000,000 for establishment of municipal airport on 300-acre tract near Tarrant City, including hangars, repair and reconditioning shops, oil storage and distributing building, and other field units. A. J. Hawkins is city engineer.

Houston Armature Works, Inc., 4 Preston Avenue, Houston, Tex., has awarded general contract to J. A. Roberts, Bankers' Mortgage Building, for one-story plant, 100 x 150 ft., with extension, 25 x 50 ft., to cost about $60,000 with equipment. E. H. Stubee, 3940 Main Street, is architect.

Louisiana Ice & Utilities, Inc., Alexandria, La., has plans for ice-manufacturing plant and power house at Lutcher, La., to cost more than $60,000 with equipment. Samuel Stone, Jr., & Co., Masonic Temple Building, New Orleans, are architects.

Barnes Machine Shop, Inc., 1009 Washington Street, Houston, Tex., has plans for a one-story machine shop, 50 x 75 ft., to cost about $25,000 with equipment.

Swann Corporation, Birmingham, has arranged for increase in capital from 120,000 to 2,100,000 shares, no par value, and plans expansion and improvements in different subsidiary units, including Southern Manganese Corporation, Federal Phosphate Co., Federal Abrasive Co., Provident Chemical Co., with plant at St. Louis; Birmingham Glass Works, Birmingham; Naphthalene Products Co., Birmingham, and Iliff-Bruff Chemical Co., Hoopeston, Ill. Main works are at Anniston, Ala.

Central Texas Iron Works, Inc., 2125 Webster Avenue, Waco, Tex., has plans for new plant at Abilene, Tex., where 6-acre tract was recently acquired, to cost more than $80,000 with equipment. Main unit will be 50 x 200 ft.

Galveston Electric Co., Galveston, Tex., is arranging fund of about $150,000 for extensions and improvements in power plants and transmission system.

Board of Education, Bogalusa, La., has plans for construction of two-story W. H. Sullivan memorial manual training school, to cost about $50,000 with equipment. Rathbone DeBuys, Hibernia Bank Building, New Orleans, is architect.

Department of Parks, Beaumont, Tex., has authorized establishment of municipal airport on Calder Road, including hangar, repair facilities and other field units, to cost $100,000 with equipment. Frank Bertschler is superintendent.

St. Louis

ST. LOUIS, Jan. 6.—Modern Engineering Co., 3411 Pine Boulevard, St. Louis, manufacturer of welding equipment and supplies, is considering a one-story addition, to cost more than $35,000 with equipment.

Ryan Aircraft Corporation, Lambert-St. Louis Flying Field, Anglum, Mo., has plans for one-story addition to aircraft manufacturing plant, 64 x 89 ft., to cost about $25,000 with equipment. McDonald & Condie, 4485 Olive Street, St. Louis, are architects.

Common Council, Unionville, Mo., has plans for extensions and improvements in municipal electric light and power plant, including installation of additional equipment. W. B. Rollins & Co., Railway Exchange Building, Kansas City, Mo., are consulting engineers.

Standard Brake Shoe & Foundry Co., West Pullen Street, Pine Bluff, Ark., is considering an expansion and improvement program, including one or more new units with equipment.

Southwest Cotton Oil Co., East Chickasaw Avenue, Oklahoma City, Okla., is planning to rebuild machine shop, storage and distributing plant, recently destroyed by fire.

National Air Control Co., 300 Southwest Boulevard, Kansas City, Mo., manufacturer of air conditioning and ventilating equipment, has leased property at Guinotte Avenue and Vine Street, for new factory unit.

City Council, El Dorado Springs, Mo., has plans for a municipal electric light and power plant, to cost more than $50,000 with equipment. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., is engineer.

Johnson Tin Foil & Metal Co., 6106 South Broadway, St. Louis, has asked bids on general contract for two-story and basement addition, 100 x 105 ft., to cost about $45,000 with equipment. Charles F. Deitering, Central National Bank Building, is architect.

Ozark Reduction Co., Jasper, Ark., is considering construction of a lead and zinc mining and refining plant on local properties, including hydroelectric power plant on Buffalo River, about two miles from city, entire project to cost over $1,000,000 with equipment. Gordon N. Peay, chairman of board, W. B. Worthen Co., Little Rock, Ark., banker, is president.

Continental Oil Co., Ponca City, Okla., has work under way on extensions and improvements in refinery, including installation of by-products plants, to cost over $1,000,000 with machinery.

All-Steel Products Co., 300 South Wichita Street, Wichita, Kan., has filed plans for a one-story plant, 75 x 150 ft., for which general contract recently was let to A. W. Wilson Construction Co., 217 South Terrace Drive, to cost about $35,000 with equipment.

Missouri Pacific Railroad has purchased a Putnam 54-in. heavy-duty motor-driven lathe for its Houston, Tex., shops from Manning, Maxwell & Moore, Inc.

Indiana

INDIANAPOLIS, Jan. 6.—Highland Iron & Steel Co., Terre Haute, has plans for one-story steel fabricating plant, 120 x 400 ft., to cost about $100,000 with equipment. John B. Schlossberg is manager.

South Meridian Motor Inn, Inc., care of Skiles E. Test, head of Circle Motor Inn, Inc., 9 West Market Street, Indianapolis, recently organized by Mr. Test and associates, has secured property at Meridian and Chesapeake Streets, 100 x 202 ft., as site for five-story and basement automobile service, repair and garage building, to cost $275,000 with equipment. Bishop, Knowlton & Carson, 312 North Meridian Street, are architects.

Gordon Body Co., 306 North Talbot Street, Indianapolis, manufacturer of automobile bodies, has awarded general contract to Godsey & Carr, Mooresville, for one-story plant, to cost about $25,000 with equipment.

Houdaille-Hershey Corporation, 537 East Delevan Avenue, Buffalo, manufacturer of automobile shock absorbers, etc., has acquired large interest in Schwitzer-Cummins Co., 1125 Massachusetts Avenue, Indianapolis, manufacturer of motor cooling fans, pumps and other automotive equipment, and will operate as unit of organization. Company will be removed to former local plant of Oakes Products Corporation, another subsidiary, at 3019 Roosevelt Avenue, where increased output will be arranged. Oakes company recently removed Indianapolis and Detroit plants to new factory at North Chicago, Ind., where production will be concentrated and increased. Biflex Products Co., North Chicago, another interest, has removed its plant to new works at Decatur, Ill., where output will be enlarged, and Hershey Mfg. Co., 4650 Fulton Street, Chicago, manufacturer of automobile locks and other devices, a subsidiary, will occupy former Biflex plant at Decatur for expansion.

American Zinc Products Co., Greencastle, is considering one-story addition,

to cost more than $45,000 with equipment.

International Steel & Iron Co., Evansville, has plans for a new shop, 120 x 555 ft. Less than a year ago company completed an addition, 90 x 603 ft., to its steel fabricating plant.

Robert Berner Structural Steel Co. and Hetherington & Berner, both of Indianapolis, have been merged and will be known hereafter as Hetherington & Berner, Inc., with Robert Berner as president. Berner interests have acquired Hetherington holdings and the two companies are now operating at the Hetherington & Berner plant. The company does structural steel fabricating, foundry and machine shop work, specializing in manufacture of steel storage bins, centrifugal sand and dredging pumps, dredging machinery and construction of complete steel dredges.

Engineering Metal Products Corporation, 401 South Harding Street, Indianapolis, has recently been formed as a consolidation of Central Wire & Iron Works, T. Roch Iron Works, James H. Carnine & Co. and Diamond Wire & Iron Works to engage in design, fabrication and erection of ornamental iron, bronze and general fireproof building products. Officers are: James H. Carnine, president; F. G. Phillips, vice-president; L. E. Gettins, secretary, and George H. Roch, treasurer.

Ground has been broken for a new factory for Marion Craftsman Tool Co., Marion, Ind.

Work was started recently on erection of a building at Newcastle, to house Thomas Mfg. Co., which will move to that city from Aurora, Ill. Company manufactures builders' hardware and steel products.

Pacific Coast

SAN FRANCISCO, Jan. 2.—Audio Vision Appliance Co., 1016 Sycamore Street, Los Angeles, manufacturer of radio equipment, etc., has awarded general contract to Austin Co. of California, Inc., for one-story plant, 60 x 150 ft., to cost about $65,000 with equipment.

Board of Education, Pasadena, Cal., plans one-story vocational shop at junior high school at Altadena, entire project to cost $250,000. Marston & Maybury, Pasadena, are architects.

Southern Sierras Power Co., Riverside, Cal., is planning extensions and improvements in power facilities at Elsinore and vicinity, including transmission lines, to cost $100,000. Company has plans for a new power substation at San Bernardino.

E. A. Eames, 353 Sacramento Street, San Francisco, architect, has awarded a general contract to Barrett & Hilp, 918 Harrison Street, for a three-story and basement automobile service, repair and garage building at Oakland, Cal., to cost about $150,000 with equipment.

Portland Electric Power Co., Electric Building, Portland, is arranging for expansion to cost $4,300,000, about one-half of which will be used for an addition to steam-operated electric generating plant at foot of East Lincoln Street, Portland, and extension in Oak Grove hydroelectric generating plant on Clackamas River. Other work will include extensions in transmission lines, power substations, equipment storage and distributing facilities, etc., to cost about $1,700,000 of fund noted.

Idaho Portland Cement Co., care of E. J. Simons, Lloyd Apartments, Spokane, Wash., has secured 25-acre tract near municipal airport at Pocatello, Idaho, for erection of cement products plant, to cost about $100,000 with equipment.

Public Utilities Department, City Hall, Tacoma, Wash., is disposing of a bond issue of $1,500,000, proceeds to be used for expansion in municipal hydroelectric power plant and system.

Overhead Door Co. of California, Inc., 1401 Madison Street, Oakland, Cal., manufacturer of garage doors, etc., has awarded a general contract to Wiley Vaughn, 501 Welden Street, for a one-story factory, to cost about $21,000 with equipment. Guy L. Brown, American Bank Building, is architect.

Bagdad Mining Co., Prescott, Ariz., is planning new copper ore reduction plant at properties about 40 miles from city, including power house, machine shop and other units, to cost more than $1,000,000.

Great Falls Iron Works, Great Falls, Mont., is contemplating increasing its facilities and will manufacture equipment for the oil industry.

Canada

TORONTO, Jan. 6.—Total sales of machine tools by builders and dealers in the Dominion made a high record in 1929. Many companies expect to continue their programs of replacements and with new plants under construction, for which equipment still has to be purchased, the outlook for the machine tool industry for the next six months at least is bright.

Hayes Wheels & Forgings, Ltd., 240 Raleigh Street, Chatham, Ont., will erect an addition to its plant on Spencer Avenue.

National Steel Car Co., Ltd., Hamilton, Ont., has let contract to W. H. Yates Construction Co., Ltd., 17 Main Street, East, for an addition to cost $25,000.

S. E. Dinsmore & Co., Security Building, Windsor, Ont., have been awarded contract for a foundry at 400 Bloomfield Road, Sandwich, Ont., to cost $150,000. Pennington & Boyd, Security Building, Windsor, are architects.

Canadian Tube & Steel Products, Ltd., 107 Hamilton Street, Montreal, has let contract to Walter G. Hunt & Co., Ltd., 1407 Bishop Street, for a one-story addition.

Foreign

A FUND of about 4,000,000 pesos (about $2,000,000) is being arranged by Government Ministry of Communications, Mexico City, Mexico, for extensions and improvements in seaports, including Vera Cruz, Puerto Mexico, Salina Cruz, Acapucco, and other ports on East and West coasts. Work will comprise purchase of dredging plants, mechanical-handling and conveying equipment and other cargo-handling facilities, cranes, etc. Same department will also expend 3,000,000 pesos (about $1,500,000) for aerial communication, including aircraft, airports, repair and reconditioning plants and other mechanical facilities.

Norton Co., Worcester, Mass., manufacturer of grinding machinery, abrasive wheels, etc., is contemplating construction of new plant in England, to cost more than $200,000 with equipment.

Secretary of Public Works and Tenders Committee, Wellington, New Zealand, is asking bids until Feb. 18 for quantity of galvanized steel screens.

American & Foreign Power Co., operated by Electric Bond & Share Co., 2 Rector Street, New York, has purchased Mendoza Empresa de Luz y Fuerza, Mendoza, Argentina, operating local electric light and power plant and system; also, properties of Compania de Electricidad de la Provincia de Buenos Aires, located at Mar del Plata, San Pedro, San Luis, San Nicolas, Azul and Junin, in Province of Buenos Aires, Argentina. Purchasing company will carry out expansion and improvement program, including transmission lines and distributing systems.

Hungarian State Railways, Budapest, Hungary, have approved plans for electrification of Budapest-Hegyeshalom railroad (Hungarian division of Budapest-Vienna line), to cost more than 12,000,000 pengoes (about $2,100,000), of which 2,800,000 pengoes (about $490,000) will be expended for electric locomotives.

Colin B. Kennedy Corporation, Highland, Ill., manufacturer of radio equipment, is considering establishment of an assembling plant at Melbourne or vicinity, Australia, to cost over $150,000 with equipment.

Ford Motor Co., Detroit, has begun construction of new self-contained plant in England, for parts production and assembling of Ford automobiles and engines, to cost over $1,000,000.

New Trade Publications

Upright Drills.—Oesterlein Machine Co., Cincinnati. Construction details of Aurora drilling machines and specifications on all sizes from 20 to 44 in. are given. Special machines, such as high-speed drills for production work, combination boring and facing machines and lapping machines, that can be built from Aurora drill units are also illustrated. Several improvements, mainly in the material used have been made in these machines.

Hand-Forged Chain.—Swedish Iron & Steel Corporation, 66 Rutledge Street, Brooklyn, N. Y. Leaflet devoted to "Sisco-Safe-T" chain made from Swedish charcoal Lancashire wrought iron rod stock. High elongation, about 40 per cent, and reduction of area 65-70 per cent are emphasized as providing toughness and resistance to vibratory stresses, also as giving ample indication before failure. This iron is also claimed to show remarkable toughness at very low temperatures.

Shapers.—Cincinnati Shaper Co., Cincinnati. Catalog of 28 pages, describing the Cincinnati line of 22 shapers, the illustrations of the machines being in three colors. In addition to the selective multiple cam feeds that prevent feeding on the forward stroke, internal transmission, visible automatic oiling system, new style ram, one piece bull gear, and other features of these machines, shaper design in general is discussed in the last half of the catalog.

Turret Lathes.—Jones & Lamson Machine Co., Springfield, Vt. Features of construction and the standard tool outfits furnished with the new 2½ x 24-in. J & L flat turret lathe (2½ x 24-in. bar and 12-in. chuck) are described in a booklet designated as form 91. Outstanding features include the flat turret, cross-sliding headstock, minimum spindle and tool overhang, selective speeds and feeds, and small number of operating devices.

Polishing and Plating Equipment and Supplies.—Hanson-Van Winkle-

Munning Co., Matawan, N. J. Catalog No. 109, 128 pages, 8½ x 11 in. Illustrates and describes a wide variety of buffs, buffing compositions, polishing wheels, steel wire and other brushes. Plating supplies include anodes of all kinds, equipment for solution control, wire dipping baskets and cleaning compounds, while in the plating section are shown low voltage generators, control panels, tank rheostats, plating barrels, and semi-automatic and full automatic plating conveyors. Buffing and polishing equipment includes lathes, tumbling and burnishing barrels and glue heaters. The catalog is attractively arranged and is indexed for convenient reference.

Gas Welding and Cutting Equipment.—General Welding & Equipment Co., 66 Brookline Avenue, Boston. Loose leaf catalog illustrating torches, regulators and other supplies, circle cutting machines and several models of Geweco automatic shape cutting machines.

Drive Chains.—Diamond Chain & Mfg. Co., Indianapolis. Wall poster, 20 x 30 in., giving the following data on roller chain drives: Horsepower and loads for single, double, triple and quadruple chains, tabulated separately, with maximum r.p.m. and chain velocity in ft. per min. factors. Table of tooth section profile dimensions for various Diamond chains, and table of maximum hub diameters, giving pitch of chain and number of teeth.

Tumbling Mills—Dust Filters.—Whiting Corporation, Harvey, Ill. Catalog No. 212, 8½ x 11 in., 40 pages, with visible filing tab on back cover. The company's line of tumblers and dust filters are described and several typical installations are given. A cleaning room layout diagram is included, as are data sheets for tumbler sizes.

Power Drive Equipment.—Hill Clutch Machine & Foundry Co., Cleveland. Catalog 29-A, looseleaf, 39 pages. Illustrates and describes the company's line of shafting, couplings, bearings and mountings, including the "Cleveland" type flood lubricated oil film bearings. Data sheets giving horsepower of line and head shafts, with formulae and a table of coupling service factors are included.

Drop Forgings.—Merrill Brothers, Brooklyn, N. Y. Leaflet with 16 halftones showing small and medium drop forgings.

Grinding Machines.—Cincinnati Grinders, Inc., Cincinnati. Twelve-page booklet featuring precision grinding applications, including both center and centerless types. Production figures are given.

Bending Rolls.—Buffalo Forge Co., Buffalo. Bulletin 350, 12 pages, showing a number of applications of Buffalo bending rolls.

Steam Generating Units.—Combustion Engineering Corporation, 200 Madison Avenue, New York. Booklet of 7 pages, illustrating and describing installation in the East River Station of the New York Edison Co. of three 800,000-lb. steam generating units. Each unit has 69 miles of tubes and will burn about 1000 tons of coal a day.

Method of Piling Bales.—Revolvator Co., 336-352 Garfield Avenue, Jersey City. Bulletin 85C of 4 pages illustrates and describes the art of piling bales, with mechanism for doing it.

The Week's News Quickly Told

Current Events That Bear on the Course of Business

STEADY progress at an average rate is expected during 1930 by nearly all business forecasters. Orders already placed for first quarter delivery indicate "fair to good" pace for the immediate future.

* * * * *

HOLIDAY buying was equal to a year ago. Last week retail trade was generally very slow except where merchants cleared their shelves by bargain sales . . . Collections are uniformly unsatisfactory; worse than for some weeks.

* * * * *

INDUSTRIAL conditions range from discouraging in New England to good in the South and West. Retrenchment in many lines is evident, with hand-to-mouth buying characterizing wholesale and jobbing outlets . . . Employment in the New Orleans region is good, due to extensive construction of highways and flood control works.

* * * * *

INCOME from 50 major crops was $8,580,000,000 in 1929, about one per cent higher than a year ago. Stock market losses by farmers were not great . . . Grain prices are relatively stable, despite the fact that the expected foreign demand for wheat has not yet appeared . . . Commodity price index, after rising for a month, dropped back slightly last week.

* * * * *

AUTOMOBILE production is increasing slightly, at least in the low priced class . . . Chevrolet new models are slightly cheaper; Ford's prices are unchanged. Packards are up $110 on eight cylinder cars . . . New Cadillac models carry a 16-cylinder V-block motor . . . A Chrysler official recommends cut prices for fall delivery to reduce the violent seasonal fluctuations in the industry . . . Tire factories in the Los Angeles district will increase largely their present daily capacity of 40,000 casings upon completion of plants by Firestone and Sampson companies . . . About 11,000,000 cars used the Philadelphia-Camden bridge and the Holland tunnels in 1929; traffic is increasing at such a rate that capacity will be reached by 1932.

* * * * *

FINANCIALLY, the country is rapidly getting back to a normal basis, says *Commercial & Financial Chronicle* . . . Dividends declared in 1929 totalled 4½ billions, one billion more than in 1928. December was the biggest month of the year. General Motors Corporation distributed $166,000,000 . . . For the seventh consecutive year, total sales of life insurance have broken all former records; in 1929 new policies amounted to $19,800,000,000.

* * * * *

UTILITIES will spend $2,100,000,000 for plant extensions in 1930, President Hoover is informed. This includes $700,000,000 for new telephone equipment . . . The Bell system is planning a 5-year program in southern California based on an expected increase of 14 per cent annually in its business.

* * * * *

BUILDING of Federal hospitals and court houses will be immediately epedited by an allotment of $253,000,000 to the general building fund . . . Governors of 16 States have estimated the value of public works to be undertaken in 1930 by all state and municipal agencies. The grand total (including projected Federal buildings) is $1,550,000,000, and in nearly all areas is greater than 1929.

* * * * *

FRENCH taxes (income and luxury taxes) are cut $60,000,000, and civil service salaries are increased . . . German financial experts are pessimistic over the immediate outlook. Unemployment in the chemical trade is 50 per cent greater than a year ago, but machinery exports are setting records . . . Nationalistic organizations in India, following popular leaders, make conflicting demands for immediate dominion status, home rule, and complete independence.

* * * * *

CHINESE revolutions and Indian economic depression have sharply restricted the market for silver (to be used for coinage). Continued increase in its production, as a by-product of copper and lead mining, has driven the price to a record low of 45½c. per ounce, and threatens to extinguish silver mining in Mexico . . . China and India, taking less cotton goods, intensify dullness in English textile centers, and depress price of American cotton.

* * * * *

CHICAGO is discharging 2100 city employees, in order to live within its newly adopted budget.

* * * * *

ENERGY from atomic forces cannot be made available to man in appreciable amounts, said Dr. R. A. Millikan . . . Two years observation of American babies born to tubercular parents confirms the experience of French doctors that vaccination reduces the expectancy of the disease by 90 per cent.

* * * * *

GASOLINE will in the future be retailed by Standard Oil Co. of New Jersey on the basis of refinery cost plus freight to distributing center, rather than the common practice of averaging freight costs over a considerable territory. This change is made to meet competition of California gasoline, delivered to Atlantic seaboard in tankers . . . An 86-mile 6-in. pipe line will be built to carry natural gas gasoline from Kettleman Hills to Port San Luis Obispo, Cal. . . . Tide Water Associated Oil Co. resumed dividends, interrupted since August, 1927.

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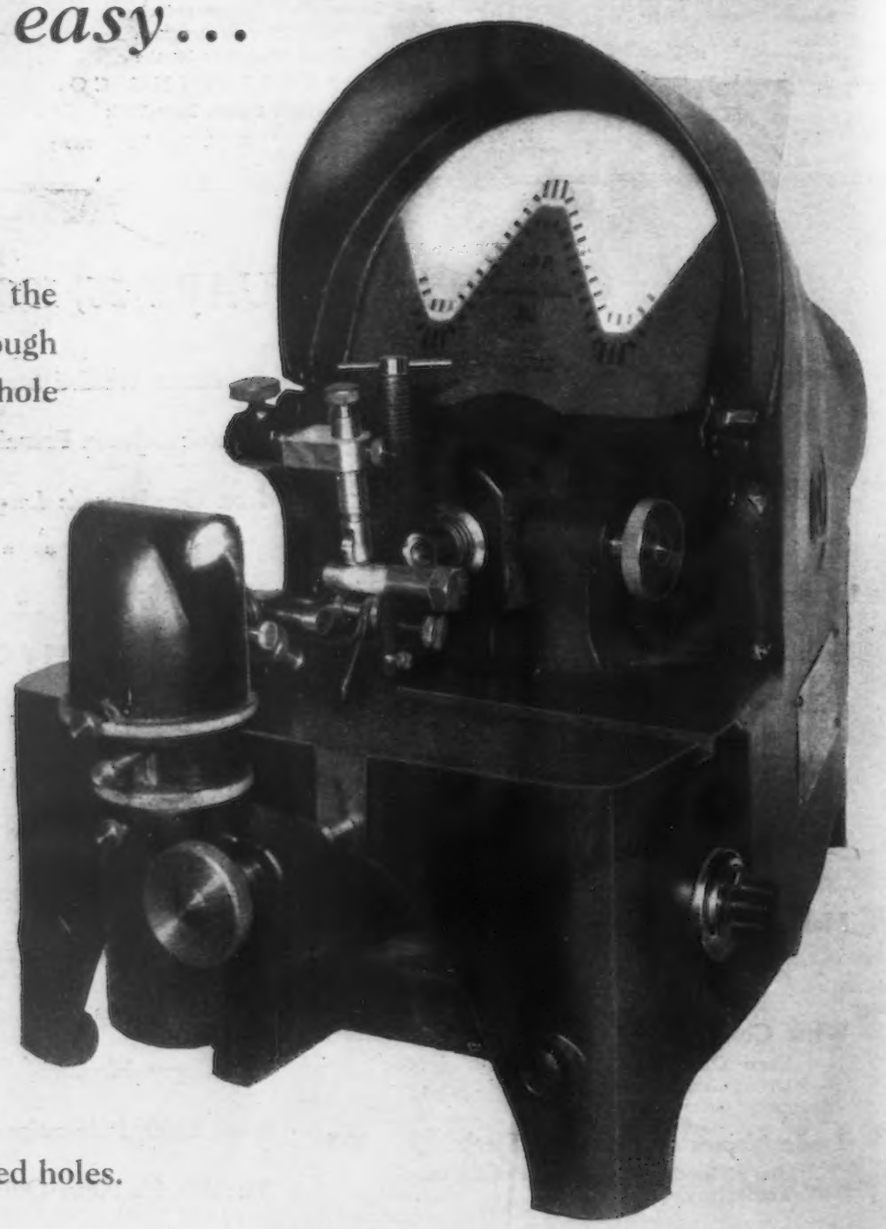
Assembling of threaded parts

made easy...



not by making the screw small enough and the tapped hole large enough . . .

...*but*

by making screws that fit the threaded holes.

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COMPARATOR GUARANTEES
SCREWS THAT FIT

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